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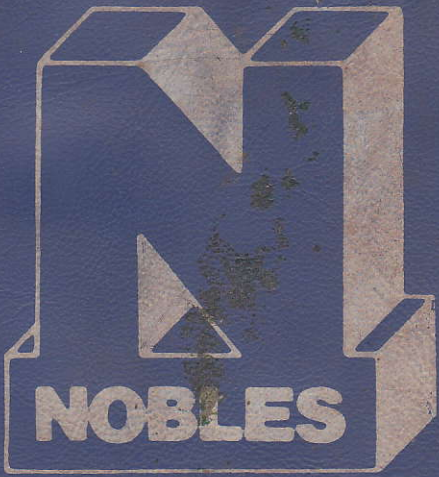
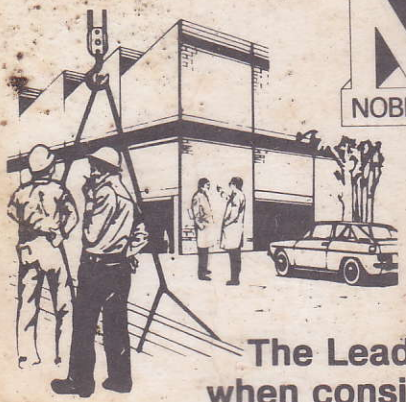


RIGGERS HANDBOOK

LIFTING GEAR



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PREFACE

The Nobles Riggers Handbook has been produced to meet a widespread demand by Riggers, Crane Drivers and Engineers for lifting gear information which can be easily carried around on the job. The booklet does not cover every kind and size of lifting gear available, but the most common day to day items. It should help individuals to recognise capacities of lifting gear generally in use.

In addition we have included other statutory and standard information on methods of lifting, storage, inspection and care of lifting gear.

This handbook is another first for Nobles, who were the first wire rope distributor in Australia to mechanically splice wire rope. Nobles were the first to produce mechanically spliced slings of 100mm diameter.

We have NATA endorsed tensile testing laboratories in Melbourne, Adelaide, Karratha, Brisbane and Sydney, including the two largest tensile testers in Australia for lifting gear viz 1000 tonnes capacity in Adelaide and 350 tonnes capacity in Melbourne. Industry groups are invited to visit our facilities for discussions and demonstrations on proper use of lifting gear.

The company's Adelaide Engineering Works manufacturers a large range of specialised sheave blocks, swivels, rigging screws and other items of lifting gear, all of which are proof loaded and covereed by a certificate before despatch. More information is available about our products in the NOBLES LIFTING GEAR CATALOGUE.

NOBEOD

1st EDITION 1980
2nd EDITION 1982
3rd EDITION 1985

A. NOBLE & SON LTD.

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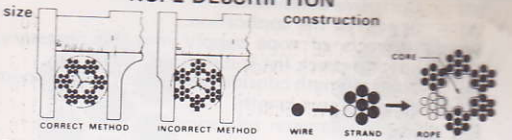
WIRE ROPE

ROPE DESCRIPTION



Size: Diameter in millimetres for all ropes.

Construction: Number of strands, the total number of wires in each strand and the arrangement of the wires in each strand.

Lay: The direction in which the strands and wires are stranded.

Core: The type of centre in the rope.

Grade: The minimum tensile strength of the wires expressed in megapascals.

Specification: The relevant specification covering the application.

Preforming: The prehelixing of the strands during the manufacture of the rope.

Postforming: The application of forming rollers after manufacture to remove rope stretch and to form certain types of rope and strand.

Lubrication: The type of lubricant added to suit the application.

ORDERING OF ROPES

All orders should contain information on the above factors. When purchasers are not sure of the exact requirements the following particulars should be submitted:—

(a) Length and size.
(b) Load exclusive of mass of the rope.

(c) Dimensions of drums and sheaves.
(d) Corrosive conditions.
(e) Sketch of the application.

Special aspects of rope supply may be necessary. The following check list is suggested:—

(a) Special length considerations such as minimum length, exact length.
(b) Special diameter tolerance.
(c) Rope end preparation.
(d) End attachments — inside or outside end.
(e) Stretch considerations.
(f) Special lubricant type and amount.
(g) Special reel dimensions, strength, shaft sizes, anchorage details, lagging.
(h) Despatch instructions.

ABBREVIATIONS OF ROPE TERMS

S	—	Seale
FW	—	Filler Wire
TS	—	Triangular Strand
WRC	—	Wire Rope Core
W	—	Warrington
SW	—	Seale Warrington
SF	—	Seale Filler Wire

LUBRICATION OF WIRE ROPE

Added lubrication is recommended for most applications. For mine winding the light lubricants which provide penetration of the rope strands are superior. For haulages, penetration and outer surface protection require a slightly heavier lubricant. Earth Moving, Excavation and Engineering ropes also benefit from additional lubricant providing the ropes do not come in direct contact with the ground. All lubricants should be applied at the drum or sheave.

CROSS SECTION OF COMMON CONSTRUCTIONS

Fig. 1
1 x 7 (6/1)

Fig. 2
1 x 19 (12/6/1)

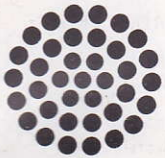


Fig. 3
1 x 37 (18/12/6/1)

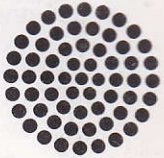


Fig. 4
1 x 61 (24/18/12/6/1)

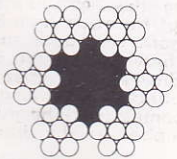


Fig. 5
6 x 7 (6/1)

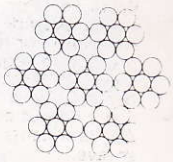


Fig. 6
7 x 7 (6/1)

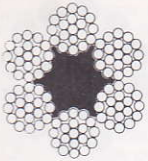


Fig. 7
6 x 19 (12/6/1)

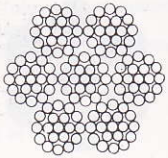


Fig. 8
7 x 19 (12/6/1)

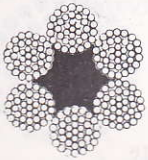


Fig. 9
6 x 37 (18/12/6/1)

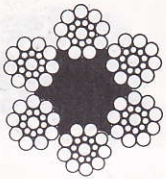


Fig. 10
6 x 19S (9/9/1)

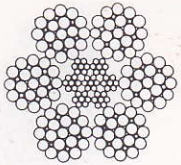


Fig. 13
6 x 25FW (12/6 + 6F/1)

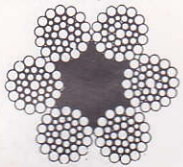


Fig. 15
6 x 36SW (14/7 & 7/7/1)

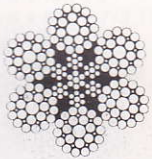


Fig. 16
6 x 29FW (14/7 + 7F/1

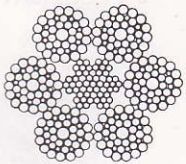


Fig. 17
6 x 41SW (16/8 & 8/8/1)

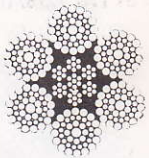


Fig. 18
6 x 49SF (16/16/8 + 8/

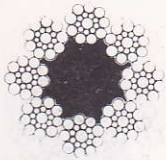


Fig. 19
8 x 19S (9/9/1)

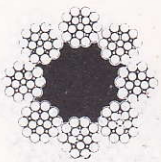


Fig. 20
8 x 21FW (10/5 + 5F/1)

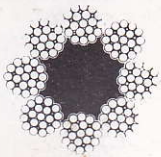


Fig. 21
8 x 25FW (12/6 + 6F/1)

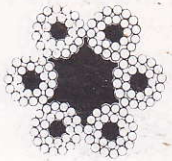


Fig. 22
6 x 24 (15/9/F)

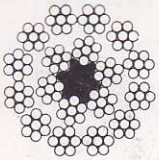


Fig. 23
18 x 7 (6/1) NR

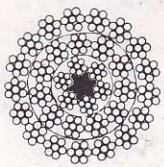


Fig. 24
34 x 7 (6/1) NR

Fig. 25
12 x 6/3 x 24 NR

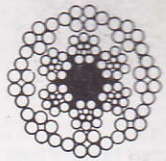


Fig. 26
8 x 6/6 x 7/3 TS
(Also 9 x 6/6 x 7/3 TS)

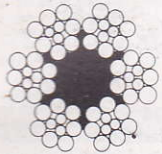


Fig. 27
6 x 7/3 TS

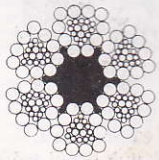


Fig. 28
6 x 10/12/3 TS

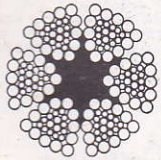


Fig. 29
6 x 12/12/3 TS

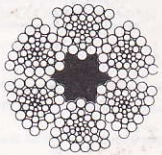


Fig. 30
6 x 15/12/9 TS

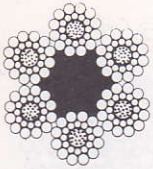


Fig 31.
6 x 24 (12/12/Fibre)

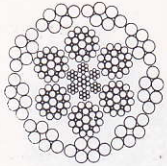


Fig. 32
9 x 6/6 x 25 FW/7 x 7

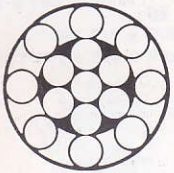


Fig. 33
Half Locked Coil

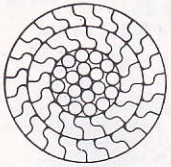
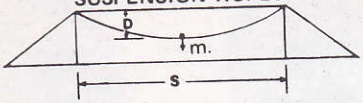


Fig. 34
Locked Coil



Level Span of Uniform Mass with Anchored Ends

Approximate Tension on Line, $T := 1.22\left(\frac{W.S.^2}{D}\right)$

As Above with Concentrated Mass at Span Midpoint

Approximate Tension on Line, $T := 1.22\left(\frac{2.M.S.}{D} + \frac{W.S.^2}{D}\right)$

$= 1.22.S\left(\frac{2.M + W.S}{D}\right)$

Where: T = Tension on Line in Newtons
S = Span in metres
W = Mass of rope in kilograms/metres
M = Mass at centre in kilograms
D = Deflection in metres

NOTES ON TABLES OF MASS AND BREAKING FORCE

The following pages show rope mass in "kg per 100 metres" and breaking force in "kilonewtons" for the various rope groups.

It will be noted that the value varies from group to group since the various constructions contain different steel areas and variable losses are incurred as the result of the stranding of the wires.

Wire quality has been nominated in 1770 grade for the majority of wire ropes; the value 1770 corresponding to the minimum tensile strength of the wire expressed in megapascals. Marine and General purpose galvanised ropes have been nominated in 1570 grade and are confined to certain rope constructions. Other constructions in galvanised rope should be ordered in 1770 grade.

Elevator rope tables have been included in two quality combinations 1420 grade outers with 1770 grade inner wires and 1570 outers with 1770 grade inner wires.

Special shovel and dragline ropes and all elevator ropes carry the prefix SEQ. (Special Excavator/Elevator Quality).

The breaking forces of ropes of tensile grades other than 1770 can be calculated by multiplying the value for 1770 grade by the ratio of the grade numbers. The grade of 2070 is the preferred high tensile grade although 1970 grade is available where closer breaking force values are required in special circumstances.

The change to metric units now allows all ropes to be nominated in millimetre diameter. Only preferred sizes have been included in the tables. Non preferred sizes should be the subject of special enquiry. Special non preferred sizes to suit existing deep mining and large excavator equipment are available although new equipment should only use preferred diameters.

The breaking force unit is the kilonewton, the newton being the force which applied to a mass of one kilogram produces an acceleration of one metre per second per second. All gravitational forces should be calculated on a gravitational acceleration of 9.81 m/sec^2 although for field calculations a value of 10 m/sec^2 provides a conservative force value. For example, the gravitational force produced by a mass of 5 tonnes is approximately 5 x 10 of 50kN. The minimum rope breaking force required will depend on the factor of safety covered by the application and in the case of a single supporting rope where the rope mass is ignored will be equal to the gravitational force multiplied by the factor of safety.

Minimum rope breaking force (kN) = Mass (tonnes) per rope part X factor of safety required X 9.81*

(*For field calculations 9.81 can be replaced by 10.)

WIRE ROPE

GALVANISED ROPES FOR MARINE & GENERAL PURPOSES – ROUND STRAND 6 x 7

Nom. Dia. Tolerance +4% −1%	Approximate Mass		Min. Breaking Force at 1570 MPa	
	Fibre Core Ropes	Wire Rope Core*	Fibre Core Ropes	Wire Rope Core*
mm	kg/100m	kg/100m	kN	kN
2	1.4	1.5	2.1	2.3
3	3.2	3.6	4.7	5.2
4	5.7	6.3	8.4	9.2
5	8.9	9.9	13.0	14.3
6	12.9	14.3	18.7	20.6
7	17.8	19.7	25.5	28.2
8	22.9	25.2	33.5	36.0
9	29.0	32.0	42.2	45.7
10	35.7	39.2	52.2	56.2
11	43.2	47.5	63.0	68.2
12	51.5	56.7	75.0	81.0
13	60.4	66.4	88.1	95.2
14	70.1	77.1	102	110
16	91.5	101	134	144
18	116	128	169	183
20	143	157	209	225
22	173	190	252	273
24	206	227	300	324
26	242	266	353	381
28	280	308	409	442
32	366	403	534	577

*Includes 7 x 7 up to 7 mm

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81.

e.g. 12mm 6x7 Fibre G1570 grade = 75kN = $\frac{75}{9.81}$
= 7.65 tonnes

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

WIRE ROPE

GALVANISED ROPES FOR MARINE & GENERAL PURPOSES
ROUND STRAND 6 x 19, 9/9/1, 6 & 6/6/1, 12/6/1

Nom. Dia. Tolerance +4% −1%	Approximate Mass		Min. Breaking Force at 1570 MPa	
	Fibre Core Ropes	Wire Rope Core*	Fibre Core Ropes	Wire Rope Core*
mm	kg/100m	kg/100m	kN	kN
3.5	4.2	4.6	5.6	6.4
4	5.5	6.1	7.7	8.5
5	8.6	9.5	12.0	13.2
6	12.4	13.7	17.6	19.3
7	16.9	18.7	23.4	25.8
8	22.1	24.4	30.9	33.3
9	28.0	30.8	39.1	42.2
10	34.6	38.1	48.2	52.1
11	41.9	46.1	58.4	63.1
12	49.8	54.8	69.5	75.0
13	58.5	64.3	81.5	88.1
14	67.8	74.6	94.6	102
16	88.6	97.4	124	133
18	112	123	156	169
20	138	152	193	208
22	167	184	234	252
24	199	219	278	300

*Note – 6 x 12/6/1, 6 x 6 & 6/6/1 only to 16mm

*Includes 7 x 19 up to 7 mm

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81.

e.g. 12mm 6 x 9/9/1 Fibre G1570 grade =

69.5 kN = $\frac{69.5}{9.81}$ = 7.08 tonnes

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

WIRE ROPE

GALVANISED ROPES FOR MARINE & GENERAL PURPOSES – ROUND STRAND 6x24 FIBRE CORE

Nom.Dia. Tolerance +6% –1%	Approximate Mass	Min. Breaking Force at 1570 MPa
mm	kg/100m	kN
5	7.9	11.0
6	11.4	15.8
7	15.6	21.5
8	20.4	28.2
9	25.8	35.6
10	31.8	44.0
11	38.5	53.2
12	45.8	63.3
13	53.8	74.3
14	62.4	86.2
16	81.5	113
18	103	143
20	127	176
22	154	213
24	183	253
26	215	297
28	250	345
32	326	450

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81.

e.g. 12 mm 6 x 24 G1570 grade = 63.3 kN = $\frac{63.3}{9.81}$
= 6.45 tonnes.

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

WIRE ROPE

GALVANISED ROPES FOR MARINE & GENERAL PURPOSES

ROUND STRAND 6x37 (18/12/6/1) FIBRE CORE

Nom.Dia. Tolerance +4% –1%	Approximate Mass	Min. Breaking Force at 1570 MPa
mm	kg/100m	kN
32	354	474
36	448	600
40	554	741
44	670	896
48	797	1070
52	936	1250
56	1090	1450
60	1250	1700
65	1480	2000
70	1700	2300

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81.

e.g. 52mm 6x37 Fibre G1570 grade = 1250kN = $\frac{1250}{9.81}$
= 127.4 tonnes.

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

ROUND STRAND EQUAL LAY

6x19S(9/9/1)	8mm to 44mm	6x36SW(14/7 & 7/7/1)	9mm to 28mm
6x25FW(12/6 + 6F/1)	8mm to 60mm	6x41SW(16/8 & 8/8/1)	32mm to 52mm
6x29FW(14/7 + 7F/1)	12mm to 44mm	6x49SFW(16/16/8+9F/1)	54mm to 60mm

Nom. Dia. Tol. +4% −1%	Approximate Mass				Min. Breaking Force at 1770 MPa	
	6x9/9/1		6x25 to 49		Fibre Core	WRC
	Fibre Core	WRC	Fibre Core	WRC		
mm	kg/100m	kg/100m	kg/100m	kg/100m	kN	kN
8	24	26	24.4	26.8	37.2	40.2
9	30	33	30.8	33.9	47.3	51.1
10	37	41	38.0	41.8	58.4	63.1
11	45	50	46.0	50.6	70.7	76.3
12	54	59	54.7	60.2	84.1	90.8
13	63	69	64.3	70.7	98.7	107
14	73	80	74.5	82.0	114	124
16	95	105	97.3	107	149	161
18	121	133	123	135	189	204
20	149	164	152	167	234	252
22	180	198	184	202	283	305
24	215	237	219	241	336	363
26	252	277	257	283	395	426
28	292	321	298	328	458	494
32	382	420	389	428	598	646
36	483	531	493	542	757	817
40			608	669	934	1010
44			736	810	1130	1220
48			876	964	1350	1450
52			1030	1130	1580	1710
56			1190	1310	1830	1980
60			1370	1510	2100	2270

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81

e.g. 12 mm 6x9/9/1 Fibre 1770 grade = 84.1 kN = $\frac{84.1}{9.81}$ = 8.57 tonnes

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

NON ROTATING
34 x 7 FIBRE CORE

Nom.Dia. Tolerance +4% −1%	Approximate Mass	Min. Breaking Force MPa	
		2070	1770
mm	kg/100m	kN	kN
12	56.2		79.6
13	65.9	107	93.4
14	76.5	124	108
16	99.9	162	141
18	126	206	179
20	156		221
22	189	306	267
24	225	365	318
26	264	430	374
28	306		433
32	400	650	566
36	506		716
40	642		884

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81.

e.g. 12mm 34x7 Fibre 1770 grade = 79.6kN = $\frac{79.6}{9.81}$
= 8.11 tonnes

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

NON ROTATING
18 x 7(6/1) FIBRE CORE

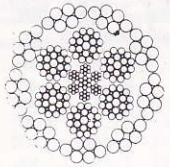
Nom.Dia. Tolerance +4% −1%	Approximate Mass	Min. Breaking Force at 1770 MPa
mm	kg/100m	kN
7	18.7	27.7
8	24.5	36.0
9	31.0	45.7
10	38.2	56.5
11	46.2	68.2
12	55.0	81.2
13	64.7	95.3
14	75.0	111
16	98.0	144
18	124	183
20	153	226
22	185	273
24	220	325
26	259	381
28	300	442

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81.
e.g. 12mm 18x7 Fibre 1770 grade = 81.2kN = $\frac{81.2}{9.81}$
= 8.28 tonnes

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

NON ROTATING

9 x 6/6 x 25 FW/7 x 7



Nom.Dia. Tolerance +4% −1%	Approximate Mass	Min. Breaking Force at 2250 MPa
mm	kg/100m	kN
14	80	162
16	98	200
18	127	256
19	141	287
22	193	390
24	220	451
26	251	511

To calculate approximate mass equivalent, at sea level, divide kilonewtons by 9.81.
e.g. 12mm 18x7 Fibre 1770 grade = 81.2kN = $\frac{81.2}{9.81}$
= 8.28 tonnes

N.B. For most practical purposes, it is sufficient to divide kilonewtons by 10. in lieu of 9.81.

WIRE ROPE

GALVANISED STRAND FOR ELECTRICAL AND GENERAL GUYING PURPOSES

Number of Wires	Wire Size	G380 Grade		G820 Grade		G1320 Grade	
		Mass per 100m	Breaking Force	Mass per 100m	Breaking Force	Mass per 100m	Breaking Force
	mm	kg	kN	kg	kN	kg	kN
7 /	0.56			1.4	1.4		
7 /	0.71			2.2	2.1		
7 /	0.90	3.6	1.6	3.6	3.5		
6 /	1.12	4.8	2.1				
7 /	1.25	6.9	3.1	6.9	6.7		
7 /	1.40	8.7	3.9	8.7	8.4		
7 /	1.60	11.3	5.0	11.3	10.9	11.3*	17.5
3 /	2.00					7.5*	11.7
7 /	2.00	17.7	7.9	17.7	17.0	17.7*	27.4
19 /	2.00			48.3	46.0	48.3*	74.0
3 /	2.75					13.9*	22.2
7 /	2.75	32.6	14.8	32.6	32.2	32.6*	51.8
19 /	2.75			91.5		91.5*	141
7 /	3.25	46.0	20.8	46.0	45.0	46.0*	72.3
19 /	3.25			127	122	127*	196
7 /	3.75	60.9	27.7	60.9	60.0	60.9*	96.2
19 /	3.75					169	260
7 /	4.00	71.0	30.7	71.0	68.5	71.0	110

*Only the items marked with an asterisk are covered by Australian Standard AS 1222 Part 1 — 1973.

WIRE ROPE

GALVANISED STRAND FOR GUYING PURPOSES

Strand Dia.	Construction	Wire Sizes	Mass per 100m	Min.Breaking Force at 1570 MPa
mm		mm/mm	kg	kN
13	1 X 19	2.65/2.90	82.7	144
14	1 X 19	2.96/3.07	110	173
16	1 X 19	3.25/3.55	133	217
18	1 X 19	3.65/4.00	168	274
20	1 X 19	4.12/4.37	214	350
22	1 X 19	4.50/4.87	255	416
24	1 X 19	4.87/5.30	299	487
26	1 X 37	3.75/4.12	343	564
28	1 X 37	4.12/4.50	415	680
32	1 X 37	4.62/5.00	522	855
36	1 X 61	4.12/4.62	705	1130
40	1 X 61	4.62/5.15	883	1410
44	1 X 91	4.12/4.75	1060	1540
48	1 X 91	4.50/5.15	1280	1830
52	1 X 91	4.87/5.60	1480	2150

WIRE ROPE

PLASTIC COATED PRODUCTS

Plastic coatings are extruded onto a range of rope and stranded products for applications requiring a high resistance to corrosion.

Plastic coated ropes are available in the following rope size and construction range:

6x7 and 7x7 up to 8mm in galvanized
6x19 and 7x19 to 12mm in galvanized
6x24 up to 12mm in galvanized

Typical applications are rigging lines, halyards, hand rails, steering lines and holding lines in the shipping, pearling and fishing industries.

Plastic coated strands are also available in P.V.C.

CLOTHES LINES

Plastic coated clothes lines are manufactured in 7/0.90mm Galvanized Mild Steel G380 and 7/0.71 mm Galvanized Mild Steel G620.

Galvanized clothes lines availalbe in 6/1.25mm and 7/1.25mm of Heavily Galvanized Mild Steel G380.

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STAINLESS STEEL WIRE ROPE

	Diameter inch	Diameter mm	Break Strain kg
Construction 1 x 19	1/16	1.6	236
	5/64	2	376
	3/32	2.4	544
	1/8	3.2	952
	5/32	4	1497
	3/16	4.8	2132
1X19 construction has the lowest stretch under load & greater strength for size than the flexible constructions Designed for standing rigging, bracing and other non flexible requirements.	7/32	5.6	2857
	1/4	6.4	3719
	9/32	7.1	4672
	5/16	7.9	5670
	3/8	9.5	7937
Construction 7 x 19	3/32	2.4	431
	1/8	3.2	726
	5/32	4	1120
	3/16	4.8	1587
Extreme flexibility & high strength. Used for halyards, control cables & hoist cables where maximum flexibility & strength are needed for smooth performance & long life.	7/32	5.6	2177
	1/4	6.4	2903
	5/16	7.9	4241
	3/8	9.5	6123
Construction 7 x 7	1/16	1.6	218
	5/64	2	299
	3/32	2.4	429
	1/8	3.2	771
	5/32	4	1179
	3/16	4.8	1678
High strength & rugged construction, for guy wires & general rigging. Sizes up to 3/32" diam are fully flexible.	1/4	6.4	2767
	5/16	7.9	4127

DRUM AND SHEAVE DIAMETER

Rope Constructions	Ratio Min. Dia.
6x7	43
6x19S (9/9/1)	32
6x19W (6 & 6/6/1)	30
6x25FW (12/6+6F/1)	23
6x36SW (14/7 & 7/7/1)	22
6+24 (15/9/F)	
6x29FW (14/7+7F/1)	
6x41SW (16/8 & 8/8/1)	21
6x37 (18/12/6/1)	19
18x7	23
12x6/3x24	23
34x7	20

RECOMMENDED SIZES FOR DRUM AND SHEAVE GROOVES

New or remachined grooves – Nominal Dia. plus 7%.
Minimum for worn grooves – Nominal Rope dia. plus 3%.

RECOMMENDED DRUM GROOVE PITCH

Single Layer Winding – Nominal Rope Dia. plus 12%.
Multiple Layer Winding – Nominal Rope Dia. plus 8%.

WIRE ROPE DRUM AND SHEAVE DATA

The choice of Drum and Sheave sizes involves the consideration of the relative effects of bending and abrasian on the rope construction, together with the economics of equipment and rope replacement cost.
For applications where bending is the prime determining factor the Minimum Sheave Ratio will give satisfactory service at medium speeds and loadings. Drum ratios in this category can be reduced to 80% of this value without greatly affecting the rope performance.

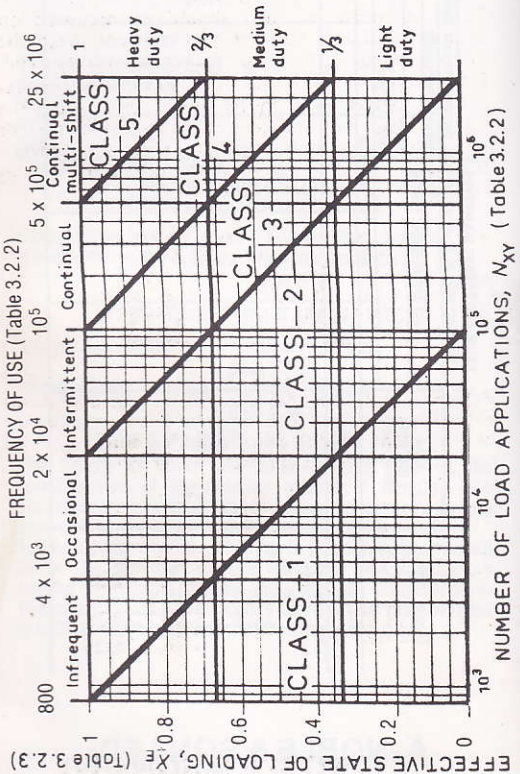
DRUM AND SHEAVE DIAMETERS

Minimum ratio of drum and sheave diameters to rope diameter

Type of rope	Hand-operated mechanism	Power-operated mechanism							
		Drum and equalizer Sheave				Sheave			
		Class of crane							
	5	1	2 and 3	4 and 5	1	5	2 and 3	4 and 5	
Fibre rope (natural or synthetic)		5	—	—			—	—	
Steel-wire rope (see AS 1656*)									
6 x 36									
6 x 37	10	15	15	18	15		17	22	
6 x 41									
6 x 43	10	15	15	20	17		18	24	
6 x 26	10	15	16	20	17		19	25	
6 x 24									
6 x 21									
6 x 25									
6 x 29	10	16	18	22	19		22	27	
6 x 31									
12 x 6/ 3 x 24									
12 x 7/ 6 x 7	10	16	18	22	19		22	27	
17 x 7/11 x 7									
6 x 19	10	20	22	28	24		28	35	

CLASSIFICATION OF CRANE APPLICATION

AS 1418, Part 1 — 1977



WIRE ROPE

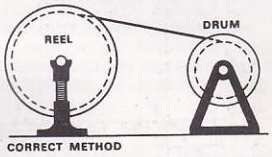
STORAGE

Storage should be in dry well aired buildings and not in contact with the floor. In hot climates reels should be turned over to prevent settling of lubricant. Additional lubricant may also be required.

HANDLING

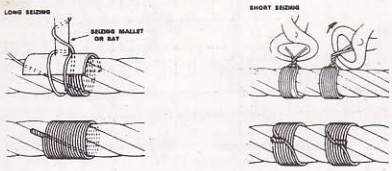
Ropes supplied on reels should be mounted on securely anchored spindles and rewound from the top of the reel to the top of the receiving reel or coil.

Heavy coils should be mounted on turntables although short coils can be safely rolled along the floor. Pulling over the sides of the reels or coils leads to kinking. For steel cored ropes every endeavour should be made to keep the rope under some tension and restricted from unlaying.



SEIZING

Before cutting, adequate seizing should be applied on each side of the cut. The length of seizing should not be less than 6 diameters of rope for non-preformed rope and 2 diameters for preformed rope.



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WIRE ROPE

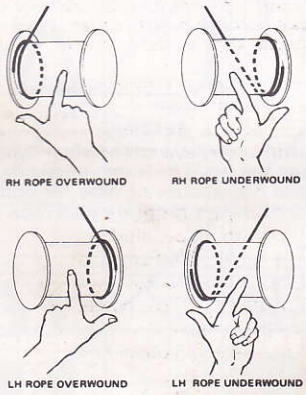
The diameter of the sheave groove should be in excess of the nominal rope diameter by an amount which ensures the correct seating of new ropes and permits free bending without pinching or binding of the rope strands and wires.

DRUM ANCHORAGE

For good bottom layer winding right hand ropes coming on to the top of the drum should be anchored on the left hand side when viewed from behind the drum.

When coming on to the bottom of the drum the anchorage should be on the right hand side. The opposite applies to left hand ropes.

'THUMB RULE' FOR DRUM ANCHORAGES



WIRE ROPE

SPLICING

Type	Size Range	No. of Tucks
Ordinary Lay	Up to 32mm	3 full + 2 alternate
Ordinary Lay	33mm to 38mm	4 full + 2 alternate
	39mm & over	4 full + 2 reduced
Crane Ropes	Up to 24mm	3 full + 2 alternate
	Over 24mm	4 full + 2 reduced
Lang's Lay	Up to 32mm	5 full + 2 reduced
	Over 32 mm	6 full + 2 reduced

LUBRICATION OF WIRE ROPE

Added lubrication is recommended for most applications. For mine winding the light lubricants which provide penetration of the rope strands are superior. For haulages, penetration and outer surface protection require a slightly heavier lubricant. Earth Moving, Excavation and Engineering ropes also benefit from additional lubricant providing the ropes do not come in direct contact with the ground. All lubricants should be applied at the drum or sheave.

SPECIAL SPLICING

Non rotating – 5 tucks + 2 reduced with all the strands grouped into six groups and tucked between the outer and inner layers. The centre strand should never be cut out.

LONG SPLICING

Ordinary Lay with no bending –
Length of splice 480 diameters

Ordinary Lay with bending –
Length of splice 770 diameters

Lang's Lay with bending –
Length of splice 960 diameters

Lang's Lay Aerial Ropes –
Length of splice 1200 diameters

INSTALLATION
ROPE EQUIPMENT CHECKING

Improved rope performance can be obtained by paying attention to the following equipment areas:

*Sheaves must be grooved to the nominal rope diameter plus an allowance of 7% to allow for rope manufacturing tolerances. Sheaves must also be free from score marks, run freely and be true.

*Guides and rollers must be free from undersized grooving and broken flanges, and should run free and true.

*Drum grooves should be checked for size and riser plates checked for effectiveness.

*Displaced or damaged cheek plates in rope blocks or safety guards should be trued up and/or repaired.

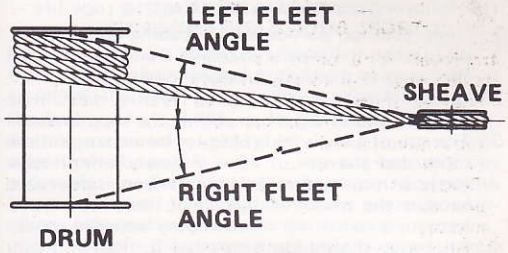
*Fleet angles between sheaves and drums should be checked. The minimum recommended fleet angle for ropes is ½°. For multi-layer wound drums fleet angles over 1½° can cause spooling problems.

*Grabbing clutches and brakes should be repaired and adjusted to obviate impact loads on the rope.

*End fittings, such as wedges, sockets and drums anchorages, should be inspected for excessive wear.

ROPE END PREPARATION

Normally, wire ropes are delivered with seized ends. As a rule, no further preparation is necessary, but in some cases where ropes must be reeved through restricted openings, such as drum anchorages and block systems, the rope can be supplied with welded tapered ends or with links welded on the ends. The latter enables the new rope to be installed by attaching it to either the old rope or a tow rope and drawing onto the equipment.



Whilst the fleet angle between sheaves and drums is usually determined by the designer and/or builder of the equipment, the angle should be checked.
The maximum recommended is 1° 30′ for flat, ungrooved drums.
Angles larger than 1° 30′ will normally produce excessive wear and spooling problems on these drums.
NOTE – Australian standard 1418 Part 1 1977 Crane Code allows 5° on ground drums, and 3° on ungrooved drums, but remember that these are maximum allowable and not the recommended value.

WIRE ROPE

The following aspects are important to rope life:—

1. High loadings, particularly a loading which takes place when the rope is changing from one layer on the drum to the next, produce lower life.
2. On multi-layer winding, good layering is essential to avoid the effect of scrubbing the rope surface.
3. The use of Lang's laid ropes for boom suspension ropes and the use of 18 x 7 non-rotating ropes for hoist ropes on mobile equipment, is desirable because the smoother surface of these rope types leads to a reduction of scrubbing between ropes.
4. All ropes should be properly "broken-in", but this practice is particularly important for non-rotating ropes, to ensure even distribution to stretch through all strand layers.
5. Rope life on single-fall wharf cranes can be extended by the use of a short pendant extension to the main rope. This pendant can be readily, and inexpensively, replaced if damage occurs during operation.
6. Flexible 6 x 36 or 6 x 41 Seale Warrington rope constructions are recommended where shock loadings are experienced and high reserve strengths are critical, e.g., for safety of personnel or equipment protection. These ropes are better suited for high operating speeds and for use on small drums and sheaves.
7. Overhauling weights must not, for several reasons, be attached at any time to single fall crane or hoist ropes, but should be attached to a length of chain fitted between the rope thimble and the hook with a ball or roller bearing swivel at the connection between the rope and the chain.

WIRE ROPE

DISCARD PRACTICE AND PERFORMANCE RECORDING

Before action is taken to discard a rope, careful inspection of the rope and evaluation of its condition as related to previous experience, should be made.

Recording of rope life, tonnage handled and production rates, form a basis for evaluation and consideration of possible ways to improve rope life. An appropriate performance recording chart is available from Australian Wire Industries to assist in compiling information on reasons for rope removal, operator performance and any special circumstances.

Inspection for actual rope deterioration should be based on experience derived from analysis of previously discarded ropes. Wear of outer wires can be easily judged, but judgment of wire fatigue requires more experience. In applications involving heavy loadings and especially those subject to vibration, the remaining life after the first fatigue failures occur is rarely more than 20%. On light loadings this may be extended to 50%.

A concentrated number of wire failures in any one strand is generally sufficient reason for rejection. The following table sets out a basis for discarding wire ropes.

Rope Maintenance Schedules, based on experience, should be drawn up to provide periodic inspections and removal cycles for each rope as well as inspections of individual components such as the sheaves. Regular maintenance ensures optimum rope life, minimises down time of plant and equipment and increases the efficiency of the operation.

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Discard factors for general crane & hoist ropes

	Maximum allowable number of broken wires		
	Total number in one rope lay	and/ or	Number of adjacent breaks in one strand
Broken wires only:			
6 x 19S (9/9/1)	10		3
6 x 25FW(12/6 & 6/1)	16		4
6 x 29FW	20		5
6 x 36SW (14/7 & 7/7/1)	22		5
6 x 41SW (16/8 & 8/8/1)	24		6

Maximum allowable wear only
Outer wires should not be worn down more than one-third (33.1/3 per cent) of their diameter.

Total loss of area
The maximum allowable loss of metallic area due to visible combined wire wear and broken or cracked wires = 15 per cent.

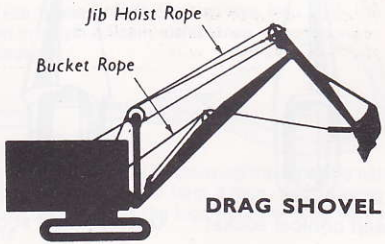
Corrosion
Ropes should be discarded if corrosion is marked by noticeable pitting or loosening of outer wires.

FACTOR OF SAFETY

The minimum Factor of Safety for wire ropes is set out below:—

Application	Factor of Safety	
	Medium duty	Heavy duty
Fixed guys and unreeved bridles on jib cranes	4	4.5
Hoisting, luffing ropes on Mobile, Crawler, Tower Cranes	4.5	5.5
General Cranes	5.0	6.0
Construction Winches	—	6
Earth moving Excavators	5	6
Logging Skylines and Main Cableways	3.5	4
Spar Tree Guys	3	4
Rope Slings	5	6

Reference should be made to Statutory regulations for applications not listed.



DRAG SHOVEL

WIRE ROPE

SOCKETING

Both British Standard Socket Metal (BSS 643–1935) or high grade Zinc can be used. Socket metal is, however, more simple and fool proof.

(a) Serve rope with two seizings the length of the socket basket back from the rope end.

(b) Open up rope strands and cut out fibre core. Steel cores must not be removed.

(c) Clean all wires as close as possible to the seizing with kerosene followed by benzine or white spirit. Only use acid if the wires cannot be cleaned by this method.

(d) Bunch wires together and fit socket placing asbestos or fire clay stopper at the socket entry.

(e) Socket metal should be heated to 310°C. sufficient to char a pine stick and the dross skimmed clear.

(f) With the socket warmed and powdered resin or flux applied to the wires a full ladle should be poured.

(g) Allow socket to cool slowly, remove fire clay and all seizing except the seizing at base of socket.

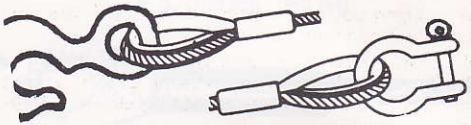
Closed conical socket

Open conical socket

Swaged eye slings.

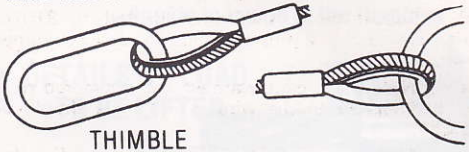
SOFT EYE

EYE WITH THIMBLE



THIMBLE AND HOOK

THIMBLE AND SHACKLE



THIMBLE AND LINK

THIMBLE AND RING

Flemish Eyes

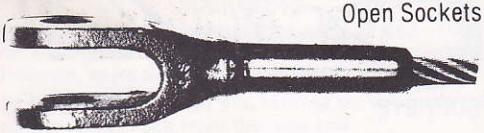
comprises a hand-made Flemish eye loop with the end encased in a hydraulically-compacted steel sleeve.

The Flemish eye is made by unlaying the rope into halves, bending one half round to form a loop, and relaying the other half back around the loop until the rope section is complete.

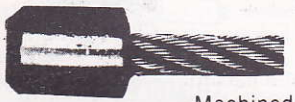
The tapered steel sleeve is fitted over the strand end.

SWAGE FITTINGS

Open Sockets



Closed Sockets



Machined Dead End Fittings

Threaded Stud Ends

WIRE SLINGS

HOW TO ORDER

- **TYPE OF SLING**

  e.g. One leg, two leg.

- **LENGTH**

  Unless otherwise stated, slings are measured from bearing to bearing, i.e. from inside to inside of the thimbles

- **DETAILS OF LOAD TO BE LIFTED**

  For unusual lifts, a diagram is always helpful.

- **END FITTINGS REQUIRED**

  Please state internal dimensions of loop or thimble required. Links, hooks and shackles can be supplied to meet special conditions.

SLINGS

WIRE ROPE SLINGS

SAFE WORKING LOADS OF SINGLE-PART, SINGLE-LEG SLINGS — 1570 GRADE

METHOD OF LOADING	DIRECT LOADED	CHOKE HITCH		BASKET HITCH									
		Round load	Rect. load	Round load					Rectangular load				
Included angle α	–	–	–	0°	45°	60°	90°	120°	0°	45°	60°	90°	120°
Loading factor	1.00	0.75	0.50	2.00	1.85	1.73	1.41	1.00	1.00	0.92	0.87	0.71	0.50
Nominal rope dia. mm	Safe working load – kilograms or tonnes												

Nominal rope dia. mm													
	6 x 24 (15/9/F) – 1570 GRADE – GALVANIZED												
8	570	430	280	1.1	1.0	990	810	570	570	530	500	400	280
9	720	540	360	1.4	1.3	1.2	1.0	720	720	670	630	570	360
10	890	670	450	1.8	1.6	1.5	1.2	890	890	830	770	630	450
11	1.1	810	540	2.1	2.0	1.8	1.5	1.1	1.1	1.0	940	760	540
12	1.3	960	640	2.5	2.3	2.2	1.8	1.3	1.3	1.2	1.1	910	640
13	1.5	1.1	750	3.0	2.8	2.6	2.1	1.5	1.5	1.4	1.3	1.0	750
14	1.7	1.3	880	3.5	3.2	3.0	2.5	1.7	1.7	1.6	1.5	1.2	880
16	2.3	1.7	1.1	4.6	4.2	4.0	3.2	2.3	2.3	2.1	2.0	1.6	1.1
18	2.9	2.2	1.4	5.8	5.4	5.0	4.1	2.9	2.9	2.7	2.5	2.0	1.4
20	3.6	2.7	1.8	7.2	6.6	6.2	5.0	3.6	3.6	3.3	3.1	2.5	1.8
22	4.3	3.2	2.1	8.7	8.0	7.5	6.1	4.3	4.3	4.0	3.7	3.0	2.1
24	5.1	3.8	2.5	10.2	9.5	8.9	7.3	5.1	5.1	4.7	4.4	3.6	2.5
26	6.0	4.5	3.0	12.1	11.2	10.5	8.5	6.0	6.0	5.6	5.2	4.2	3.0
28	7.0	5.2	3.5	14.0	13.0	12.1	9.9	7.0	7.0	6.5	6.1	4.9	3.5
32	9.1	6.8	4.5	18.3	16.9	15.8	13.0	9.1	9.1	8.4	7.9	6.4	4.5
	6 x 37 (18/12/6/1) FIBRE CORE – 1570 GRADE – GALVANIZED												
36	12.2	9.1	6.1	24.4	22.6	21.2	17.3	12.2	12.2	11.3	10.6	8.6	6.1
40	15.1	11.3	7.5	30.2	27.9	26.1	21.3	15.1	15.1	14.0	13.1	10.7	7.5
44	18.2	13.7	9.1	36.5	33.7	31.6	25.8	18.2	18.2	16.9	15.8	12.9	9.1
48	21.8	16.3	10.9	43.6	40.3	37.8	30.8	21.8	21.8	20.1	18.9	15.4	10.9
52	25.5	19.1	12.7	51.0	47.1	44.1	36.0	25.5	25.5	23.5	22.0	18.0	12.7
56	29.5	22.1	14.8	59.1	54.6	51.2	41.8	29.5	29.5	27.3	25.6	20.9	14.8
60	34.6	26.0	17.3	69.3	64.0	60.0	49.0	34.8	34.6	32.0	30.0	24.5	17.3

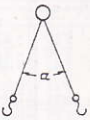
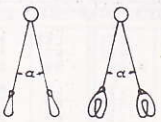
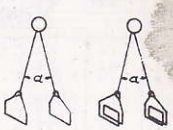
WIRE ROPE SLINGS

SAFE WORKING LOADS OF *DOUBLE-PART*, SINGLE-LEG SLINGS — 1570 GRADE

METHOD OF LOADING	DIRECT LOADED	CHOKE HITCH		BASKET HITCH									
		Round load	Rect. load	Round load					Rectangular load				
Included angle α	–	–	–	0°	45°	60°	90°	120°	0°	45°	60°	90°	120°
Loading factor	1.50	1.12	0.75	3.00	2.77	2.60	2.12	1.50	1.50	1.39	1.30	1.06	0.75
Nominal rope dia. mm	Safe working load – kilograms or tonnes												
8	860	640	430	1.7	1.6	1.5	1.2	860	860	790	740	610	430
9	1.0	810	540	2.1	2.0	1.8	1.5	1.0	1.0	1.0	940	770	540
10	1.3	1.0	670	2.6	2.4	2.3	1.9	1.3	1.3	1.2	1.1	950	670
11	1.6	1.2	810	3.2	3.0	2.8	2.3	1.6	1.6	1.5	1.4	1.1	810
12	1.9	1.4	960	3.8	3.5	3.3	2.7	1.9	1.9	1.7	1.6	1.3	960
13	2.2	1.7	1.1	4.5	4.2	3.9	3.2	2.2	2.2	2.1	1.9	1.6	1.1
14	2.6	1.9	1.3	5.2	4.8	4.5	3.7	2.6	2.6	2.4	2.2	1.8	1.3
16	3.4	2.5	1.7	6.9	6.3	5.9	4.8	3.4	3.4	3.2	2.9	2.4	1.7
18	4.3	3.2	2.2	8.7	8.0	7.5	6.1	4.3	4.3	4.0	3.7	3.0	2.2
20	5.3	4.0	2.7	10.7	9.9	9.3	7.6	5.3	5.3	4.9	4.6	3.8	2.7
22	6.5	4.8	3.2	13.0	12.0	11.2	9.2	6.5	6.5	6.0	5.6	4.6	3.2
24	7.7	5.7	3.8	15.4	14.3	13.4	10.9	7.7	7.7	7.1	6.7	5.4	3.8
26	9.0	6.7	4.5	18.1	16.7	15.7	12.8	9.0	9.0	8.4	7.8	6.4	4.5
28	10.5	7.8	5.2	21.1	19.5	18.2	14.9	10.5	10.5	9.7	9.1	7.4	5.2
32	13.7	10.3	6.8	27.5	25.4	23.8	19.4	13.7	13.7	12.7	11.9	9.7	6.8
	6 x 37 (18/12/6/1) FIBRE CORE – 1570 GRADE – GALVANIZED												
36	18.3	13.7	9.1	36.7	33.9	31.7	25.9	18.3	18.3	16.9	15.9	12.9	9.1
40	22.6	16.9	11.3	45.3	41.8	39.2	32.0	22.6	22.6	20.9	19.6	16.0	11.3
44	27.4	20.4	13.7	54.8	50.6	47.4	38.7	27.4	27.4	25.3	23.7	19.3	13.7
48	32.7	24.4	16.3	65.4	60.4	56.6	46.2	32.7	32.7	30.3	28.3	23.1	16.3
52	38.2	28.6	19.1	76.4	70.6	66.2	54.0	38.2	38.2	35.4	33.1	27.0	19.1
56	44.3	33.0	22.1	88.6	81.9	76.8	62.7	44.3	44.3	41.0	38.4	31.3	22.1
60	52.0	38.7	26.0	104.0	96.0	90.0	73.5	52.0	52.0	48.1	45.0	36.7	26.0

WIRE ROPE SLINGS

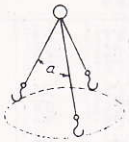
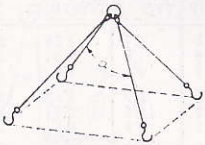
SAFE WORKING LOADS OF TWO-LEG SLINGS — 1570 GRADE

METHOD OF LOADING	DIRECT LOADED					CHOKE HITCH					
						 Round load Double wrap Single wrap			 Rectangular load Double wrap Single wrap		
Included angle α	30°	45°	60°	90°	120°	30°	45°	60°	30°	45°	60°
Loading factor	1.93	1.85	1.73	1.41	1.00	1.45	1.39	1.30	0.97	0.92	0.87
Nominal rope dia. mm	Safe working load – kilograms or tonnes										
	6 x 24 (15/9/F) – 1570 GRADE – GALVANIZED										
8	1.1	1.0	890	810	570	830	790	740	550	530	490
9	1.4	1.3	1.2	1.0	720	1.0	1.0	940	700	670	630
10	1.7	1.6	1.5	1.2	890	1.3	1.2	1.1	860	830	770
11	2.1	2.0	1.8	1.5	1.1	1.5	1.5	1.4	1.0	1.0	940
12	2.5	2.3	2.2	1.8	1.3	1.8	1.7	1.6	1.2	1.2	1.1
13	2.9	2.8	2.6	2.1	1.5	2.2	2.1	1.9	1.4	1.4	1.3
14	3.4	3.2	3.0	2.5	1.7	2.5	2.4	2.2	1.7	1.6	1.5
16	4.4	4.2	4.0	3.2	2.3	3.3	3.2	3.0	2.2	2.1	2.0
18	5.6	5.4	5.0	4.4	2.9	4.2	4.0	3.8	2.8	2.7	2.5
20	6.9	6.6	6.2	5.0	3.6	5.2	5.0	4.6	3.4	3.3	3.1
22	6.4	8.0	7.5	6.1	4.3	6.3	6.0	5.6	4.2	4.0	3.7
24	10.0	9.5	8.9	7.3	5.1	7.4	7.1	6.7	5.0	4.7	4.4
26	11.7	11.2	10.5	8.5	6.0	8.7	8.4	7.8	5.8	5.6	5.2
28	13.5	13.0	12.1	9.9	7.0	10.1	9.7	9.1	6.8	6.5	6.1
32	17.7	16.9	15.8	13.0	9.1	13.3	12.7	11.9	8.8	8.4	7.9
	6 x 37 (18/12/6/1) FIBRE CORE – 1570 GRADE – GALVANIZED										
36	23.6	22.6	21.2	17.3	12.2	17.7	17.0	15.9	11.8	11.3	10.6
40	29.2	27.9	26.1	21.3	15.1	21.9	20.9	19.6	14.6	14.0	13.1
44	35.3	33.7	31.6	25.8	18.2	26.4	25.3	23.7	17.6	16.9	15.8
48	42.1	40.3	37.8	30.8	21.8	31.6	30.2	28.3	21.0	20.1	18.9
52	49.2	47.1	44.1	36.0	25.5	36.9	35.3	33.1	24.6	23.5	22.0
56	57.1	54.6	51.2	41.8	29.5	42.8	41.0	38.4	28.5	27.3	25.6
60	67.0	64.0	60.0	49.0	34.6	50.2	48.0	45.0	33.4	32.0	30.0

A. NOBLE & SON LTD.

WIRE ROPE SLINGS

SAFE WORKING LOADS OF 3-LEG AND 4-LEG SLINGS— 1570 GRADE

METHOD OF LOADING	3-LEG ASSEMBLY			4-LEG ASSEMBLY							
	 Angle α is between adjacent legs			 Angle α is between opposite legs							
				Rigid load				Flexible load			
Included angle α	45°	60°	90°	45°	60°	90°	120°	45°	60°	90°	120°
Loading factor	2.69	2.45	1.73	1.85	1.73	1.41	1.000	3.70	3.46	2.83	2.000
Nominal rope dia. mm	Safe working load – kilograms or tonnes										

	6 x 24 (15/9/F) – 1570 GRADE – GALVANIZED										
8	1.5	1.4	890	1.0	890	810	570	2.1	2.0	1.6	1.1
9	1.9	1.7	1.2	1.3	1.2	1.0	720	2.6	2.5	2.0	1.4
10	2.4	2.2	1.5	1.6	1.5	1.2	890	3.3	3.1	2.5	1.8
11	2.9	2.7	1.8	2.0	1.8	1.5	1.1	4.0	3.8	3.1	2.1
12	3.5	3.2	2.2	2.3	2.2	1.8	1.3	4.8	4.5	3.7	2.5
13	4.1	3.7	2.6	2.8	2.6	2.1	1.5	5.6	5.3	4.3	3.0
14	4.7	4.3	3.0	3.2	3.0	2.5	1.7	6.5	6.1	5.0	3.5
16	6.2	5.6	4.0	4.2	4.0	3.2	2.3	8.5	8.0	6.5	4.6
18	7.9	7.1	5.0	5.4	5.0	4.1	2.9	10.8	10.1	8.3	5.8
20	9.7	8.8	6.2	6.6	6.2	5.0	3.6	13.3	12.4	10.2	7.2
22	11.7	10.6	7.5	8.0	7.5	6.1	4.3	16.1	15.1	12.3	8.7
24	13.9	11.6	8.9	9.5	8.9	7.3	5.1	19.1	17.9	14.6	10.2
26	16.3	14.8	10.5	11.2	10.5	8.5	6.0	22.4	21.0	17.1	12.1
28	18.9	17.2	12.1	13.0	12.1	9.9	7.0	26.0	24.3	19.9	14.0
32	24.7	22.4	15.8	16.9	15.8	13.0	9.1	33.9	31.7	25.9	18.3
	6 x 37 (18/12/6/1) FIBRE CORE 1570 GRADE – GALVANIZED										
36	32.9	30.0	21.2	22.6	21.2	17.3	12.2	45.2	42.3	34.6	24.4
40	40.6	37.0	26.1	27.9	26.1	21.3	15.1	55.8	52.3	42.7	30.2
44	49.1	44.7	31.6	33.7	31.6	25.8	18.2	67.5	63.2	51.6	36.5
48	58.7	53.4	37.8	40.3	37.8	30.8	21.8	80.6	75.5	61.7	43.6
52	68.5	62.4	44.1	47.1	44.1	36.0	25.5	94.1	88.2	72.0	51.0
56	79.5	72.4	51.2	54.6	51.2	41.8	29.5	109.2	102.4	83.6	59.1
60	93.2	84.9	60.0	64.0	60.0	49.0	34.6	128.0	120.0	98.0	69.3

WIRE ROPE SLINGS

SAFE WORKING LOADS OF SINGLE-PART, SINGLE-LEG SLINGS — 1770 GRADE

METHOD OF LOADING	DIRECT LOADED	CHOKE HITCH		BASKET HITCH									
		Round load	Rect. load	Round load					Rectangular load				
Included angle α	–	–	–	0°	45°	60°	90°	120°	0°	45°	60°	90°	120°
Loading factor	1.0	0.75	0.50	2.0	1.85	1.73	1.41	1.0	1.0	0.92	0.87	0.71	0.50
Nominal rope dia. mm	Safe working load – kilograms or tonnes												

	6 x 25 TO 6 x 41 EQUAL-LAY CONSTRUCTION WITH FIBRE CORE – 1770 GRADE												
8	760	570	380	1.5	1.4	1.3	1.0	760	760	700	650	530	380
9	960	720	480	1.9	1.7	1.6	1.3	960	960	890	830	680	480
10	1.1	890	590	2.3	2.2	2.0	1.6	1.1	1.1	1.1	1.0	840	590
11	1.4	1.0	720	2.8	2.6	2.5	2.0	1.4	1.4	1.3	1.2	1.0	720
12	1.7	1.3	860	3.4	3.1	2.9	2.4	1.7	1.7	1.5	1.4	1.2	860
13	2.0	1.5	1.0	4.0	3.7	3.4	2.8	2.0	2.0	1.8	1.7	1.4	1.0
14	2.3	1.7	1.1	4.6	4.3	4.0	3.2	2.3	2.3	2.1	2.0	1.6	1.1
16	3.0	2.2	1.5	6.0	5.6	5.2	4.3	3.0	3.0	2.8	2.6	2.1	1.5
18	3.8	2.9	1.9	7.7	7.1	6.6	5.4	3.8	3.8	3.5	3.3	2.7	1.9
20	4.7	3.5	2.4	9.5	8.8	8.2	6.7	4.7	4.7	4.4	4.1	3.3	2.4
22	5.7	4.3	2.9	11.5	10.6	10.0	8.1	5.7	5.7	5.3	5.0	4.0	2.9
24	6.8	5.1	3.4	13.7	12.6	11.8	9.7	6.8	6.8	6.3	5.9	4.8	3.4
26	8.0	6.0	4.0	16.1	14.9	13.9	11.4	8.0	8.0	7.4	6.9	5.7	4.0
28	9.3	7.0	4.6	18.7	17.2	16.1	13.2	9.3	9.3	8.6	8.0	6.6	4.6
32	12.2	9.1	6.1	24.4	22.5	21.1	17.2	12.2	12.2	11.2	10.5	8.6	6.1
36	15.4	11.5	7.7	30.9	28.5	26.7	21.8	15.4	15.4	14.2	13.3	10.9	7.7
40	19.0	14.3	9.5	38.1	35.2	33.0	26.9	19.0	19.0	17.6	16.5	13.4	9.5
44	23.0	17.3	11.5	46.1	42.6	39.9	32.6	23.0	23.0	21.3	19.9	16.3	11.5
48	27.5	20.6	13.7	55.1	50.9	47.7	38.9	27.5	27.5	25.4	23.8	19.4	13.7
52	32.2	24.1	16.1	64.4	59.5	55.8	45.6	32.2	32.2	29.7	27.9	22.8	16.1
56	37.3	28.0	18.6	74.6	69.0	64.6	52.8	37.3	37.3	34.5	32.3	26.4	18.6
60	42.8	32.1	21.4	85.7	79.2	74.2	60.6	42.8	42.8	39.6	37.1	30.3	21.4

The safe working load values may be increased by 8 percent for 1770 grade steel wire ropes of wire-rope core construction.

WIRE ROPE SLINGS

SAFE WORKING LOADS OF *DOUBLE-PART* SINGLE-LEG SLINGS — 1770 GRADE

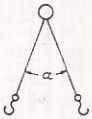
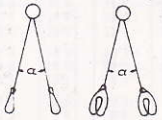
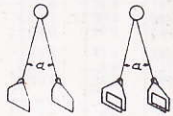
METHOD OF LOADING	DIRECT LOADED	CHOKE HITCH		BASKET HITCH									
		Round load	Rect. load	Round load					Rectangular load				
Included angle α	–	–	–	0°	45°	60°	90°	120°	0°	45°	60°	90°	120°
Loading factor	1.50	1.12	0.75	3.00	2.77	2.60	2.12	1.50	1.50	1.39	1.30	1.06	0.75
Nominal rope dia. mm	Safe working load – kilograms or tonnes												

Nominal rope dia. mm	6 x 25 TO 6 x 41 EQUAL-LAY CONSTRUCTION WITH FIBRE CORE – 1770 GRADE											
8	1.1	850	570	2.2	2.1	1.9	1.6	1.1	1.1	1.0	980	800	570
9	1.4	1.0	720	2.9	2.6	2.5	2.0	1.4	1.4	1.3	1.2	1.0	720
10	1.7	1.2	890	3.5	3.3	3.1	2.5	1.7	1.7	1.6	1.5	1.2	890
11	2.1	1.6	1.0	4.3	4.0	3.7	3.0	2.1	2.1	2.0	1.8	1.5	1.0
12	2.5	1.9	1.3	5.1	4.7	4.4	3.6	2.5	2.5	2.3	2.2	1.8	1.3
13	3.0	2.2	1.5	6.0	5.5	5.2	4.2	3.0	3.0	2.7	2.6	2.1	1.5
14	3.4	2.6	1.7	6.9	6.4	6.0	4.9	3.4	3.4	3.2	3.0	2.4	1.7
16	4.5	3.4	2.2	9.1	8.4	7.9	6.4	4.5	4.5	4.2	3.9	3.2	2.2
18	5.7	4.3	2.9	11.5	10.6	10.0	8.1	5.7	5.7	5.3	5.0	4.0	2.9
20	7.1	5.3	3.5	14.3	13.2	12.4	10.1	7.1	7.1	6.6	6.2	5.0	3.5
22	8.6	6.4	4.3	17.3	16.0	15.0	12.2	8.6	8.6	8.0	7.5	6.1	4.3
24	10.2	7.6	5.1	20.5	19.0	17.8	14.5	10.2	10.2	9.5	8.9	7.2	5.1
26	12.1	9.0	6.0	24.1	22.3	20.9	17.1	12.1	12.1	11.0	10.4	8.5	6.0
28	14.0	10.4	7.0	28.0	26.0	24.3	19.8	14.0	14.0	12.9	12.1	9.9	7.0
32	18.3	13.7	9.1	36.6	33.8	31.7	25.8	18.3	18.3	16.9	15.8	12.9	9.1
36	23.1	17.3	11.5	46.3	42.8	40.1	32.7	23.1	23.1	21.4	20.0	16.3	11.5
40	28.6	21.3	14.3	57.1	52.8	49.5	40.4	28.6	28.6	26.4	24.7	20.2	14.3
44	34.6	25.8	17.3	69.1	63.8	59.9	48.9	34.6	34.6	32.0	29.9	24.4	17.3
48	41.3	30.8	20.6	82.6	76.3	71.6	58.4	41.3	41.3	38.2	35.7	29.2	20.6
52	48.3	36.1	24.1	96.7	89.3	83.8	68.4	48.3	48.3	44.7	41.8	34.2	24.1
56	56.0	41.7	28.0	112.0	103.4	97.1	79.2	56.0	56.0	51.8	48.5	39.6	28.0
60	64.2	48.0	32.1	128.5	118.7	111.4	90.9	64.2	64.2	59.4	55.6	45.4	32.1

The safe working load values may be increased by 8 percent for 1770 grade steel wire ropes of wire-rope core construction.

WIRE ROPE SLINGS

SAFE WORKING LOADS OF TWO-LEG SLINGS — 1770 GRADE

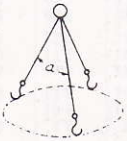
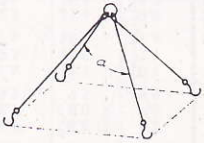
METHOD OF LOADING	DIRECT LOADED					CHOKE HITCH					
						 Round load Double wrap Single wrap			 Rectangular load Double wrap Single wrap		
Included angle α	30°	45°	60°	90°	120°	30°	45°	60°	30°	45°	60°
Loading factor	1.93	1.85	1.73	1.41	1.00	1.45	1.39	1.30	0.97	0.92	0.87
Nominal rope dia. mm	Safe working load – kilograms or tonnes										
8	1.4	1.4	1.3	1.0	760	1.1	1.0	980	730	700	650
9	1.8	1.7	1.6	1.3	960	1.4	1.3	1.2	930	890	830
10	2.3	2.2	2.0	1.6	1.1	1.7	1.6	1.5	1.1	1.1	1.0
11	2.7	2.6	2.5	2.0	1.4	2.0	1.9	1.8	1.3	1.3	1.2
12	3.3	3.1	2.9	2.4	1.7	2.4	2.3	2.2	1.6	1.5	1.4
13	3.8	3.7	3.4	2.8	2.0	2.9	2.8	2.6	1.9	1.8	1.7
14	4.4	4.3	4.0	3.2	2.3	3.3	3.2	3.0	2.2	2.1	2.0
16	5.8	5.6	5.2	4.3	3.0	4.4	4.2	3.9	2.9	2.8	2.6
18	7.4	7.1	6.6	5.4	3.8	5.5	5.3	5.0	3.7	3.5	3.3
20	9.2	8.8	8.2	6.7	4.7	6.9	6.6	6.2	4.6	4.4	4.1
22	11.1	10.6	10.0	8.1	5.7	8.3	8.0	7.5	5.5	5.3	5.0
24	13.2	12.6	11.8	9.7	6.8	9.9	9.5	8.9	6.6	6.3	5.9
26	15.5	14.9	13.9	11.4	8.0	11.6	11.1	10.4	7.7	7.4	6.9
28	18.0	17.2	16.1	13.2	9.3	13.5	12.9	12.1	9.0	8.6	8.0
32	23.5	22.5	21.1	17.2	12.2	17.6	16.9	15.8	11.7	11.2	10.5
36	29.8	28.5	26.7	21.8	15.4	22.3	21.4	20.0	14.9	14.2	13.3
40	36.8	35.2	33.0	26.9	19.0	27.6	26.4	24.7	18.4	17.6	16.5
44	44.5	42.6	39.9	32.6	23.0	33.4	31.9	29.9	22.2	21.3	19.9
48	53.2	50.9	47.7	38.9	27.5	39.9	38.1	35.7	26.6	25.4	23.8
52	62.2	59.5	55.8	45.6	32.2	46.7	44.6	41.8	31.1	29.7	27.9
56	72.1	69.0	64.6	52.8	37.3	54.1	51.7	48.5	36.0	34.5	32.3
60	82.7	79.2	74.2	60.6	42.8	62.1	59.3	55.6	41.3	39.6	37.1

6 x 25 TO 6 x 41 EQUAL-LAY CONSTRUCTION WITH FIBRE CORE – 1770 GRADE

The safe working load values may be increased by 8 percent for 1770 grade steel wire ropes of wire-rope core construction.

WIRE ROPE SLINGS

SAFE WORKING LOADS OF 3-LEG AND 4-LEG SLINGS— 1770 GRADE

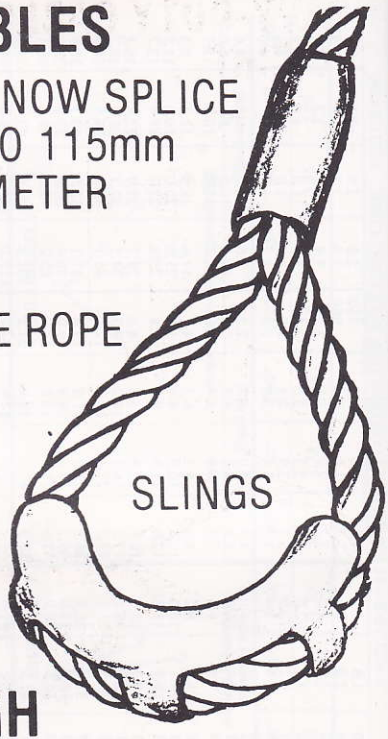
METHOD OF LOADING	3-LEG ASSEMBLY			4-LEG ASSEMBLY							
											
	Angle α is between adjacent legs			Angle α is between opposite legs							
				Rigid load				Flexible load			
Included angle α	45°	60°	90°	45°	60°	90°	120°	45°	60°	90°	120°
Loading factor	2.69	2.45	1.73	1.85	1.73	1.41	1.00	3.70	3.46	2.83	2.00
Nominal rope dia. mm	Safe working load – kilograms or tonnes										
	6 x 25 TO 6 x 41 EQUAL-LAY CONSTRUCTION WITH FIBRE CORE – 1770 GRADE										
8	2.0	1.8	1.3	1.4	1.3	1.0	760	2.8	2.6	2.1	1.5
9	2.6	2.3	1.6	1.7	1.6	1.3	960	3.5	3.3	2.7	1.9
10	3.2	2.9	2.0	2.2	2.0	1.6	1.1	4.4	4.1	3.3	2.3
11	3.8	3.5	2.5	2.6	2.5	2.0	1.4	5.3	5.0	4.0	2.8
12	4.6	4.2	2.9	3.1	2.9	2.4	1.7	6.3	5.9	4.8	3.4
13	5.4	4.9	3.4	3.7	3.4	2.8	2.0	7.4	6.9	5.7	4.0
14	6.2	5.7	4.0	4.3	4.0	3.2	2.3	8.6	8.0	6.5	4.6
16	8.1	7.4	5.2	5.6	5.2	4.3	3.0	11.2	10.5	8.6	6.0
18	10.3	9.4	6.6	7.1	6.6	5.4	3.8	14.2	13.3	10.9	7.7
20	12.8	11.7	8.2	8.8	8.2	6.7	4.7	17.6	16.5	13.5	9.5
22	15.5	14.1	10.0	10.6	10.0	8.1	5.7	21.3	20.0	16.3	11.5
24	18.4	16.8	11.8	12.6	11.8	9.7	6.8	25.3	23.7	19.4	13.7
26	21.7	19.7	13.9	14.9	13.9	11.4	8.0	29.7	27.9	22.8	16.1
28	25.1	22.9	16.1	17.2	16.1	13.2	9.3	34.5	32.3	26.4	18.7
32	32.8	29.9	21.1	22.5	21.1	17.2	12.2	45.1	42.2	34.5	24.4
36	41.5	37.8	26.7	28.5	26.7	21.8	15.4	57.1	53.5	43.7	30.9
40	51.3	46.7	33.0	35.2	33.0	26.9	19.0	70.4	66.0	53.9	38.1
44	62.0	56.5	39.9	42.6	39.9	32.6	23.0	85.2	79.8	65.2	46.1
48	74.1	67.5	47.7	50.9	47.7	38.9	27.5	101.8	95.4	77.9	55.1
52	86.7	79.0	55.8	59.5	55.8	45.6	32.2	119.1	111.7	91.2	64.4
56	100.5	91.5	64.6	69.0	64.6	52.8	37.3	138.0	129.3	105.6	74.6
60	115.3	104.9	74.2	79.2	74.2	60.6	42.8	158.3	148.4	121.2	85.7

The safe working load values may be increased by 8 percent for 1770 grade steel wire ropes of wire-rope core construction.

NOBLES

CAN NOW SPLICE
UP TO 115mm
DIAMETER

WIRE ROPE



HIGH PERFORMANCE WIRE ROPE

A. NOBLE & SON LTD.

HEAVY-DUTY CABLE SPLICING

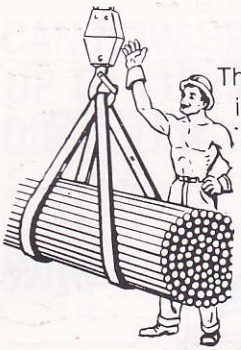
Nominal Rope Diameter		Minimum Breaking Load	Mass (Weight)
mm	inch	kN	Kg/m.
52	2″	1710	9.64
56	2¼″	2050	13.9
64	2½″	2580	17.3
75	3″	3740	24.7
90	3½″	5110	33.8
102	4″	6340	44.0
115	4½″	7900	55.7

WIRE ROPE SLINGS

THE ABOVE MINIMUM BREAKING LOADS MAY VARY AND SHOULD BE CHECKED PRIOR TO ORDERING.

A. NOBLE & SON LTD.

WEBBING SLINGS



The capacity of a Sling is dependent on the lifting method employed

S.W.L. as marked on Sling

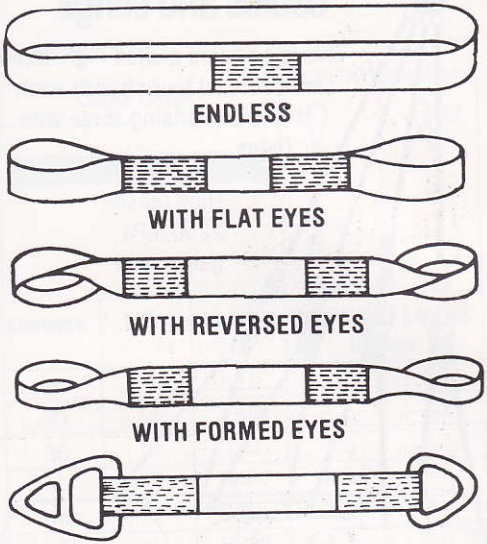
SINGLE-PART OR DOUBLE-PART **

WIDTH	MATERIAL	CAPACITY Tonne
25 mm	"Terylene" Polyester Fibre	0.5
25 mm	"Terylene" Polyester Fibre	1.0 **
50 mm	Nylon Polyamide Fibre	1.0
50 mm	Nylon Polymide Fibre	2.0 **
75 mm	"Terylene" Polyester Fibre	1.5
75mm	"Terylene" Polyester Fibre	2.2 **
100 mm	Nylon Polyamide Fibre	2.5
100 mm	Nylon Polyamide Fibre	4.4 **
150 mm	"Terylene" Polyester Fibre	2.9
150 mm	"Terylene" Polyester Fibre	5.0 **
200 mm	Nylon Polyamide Fibre	3.5
200 mm	Nylon Polyamide Fibre	6.5 **
300 mm	"Terylene" Polyester Fibre	4.5
300 mm	"Terylene" Polyester Fibre	8.5

SAFE WORKING LOAD IN STRAIGHT PULL

A. NOBLE & SON LTD.

TYPES OF SYNTHETIC-WEBBING FLAT SLING



ENDLESS

WITH FLAT EYES

WITH REVERSED EYES

WITH FORMED EYES

WITH TERMINAL ATTACHMENT AT EACH END

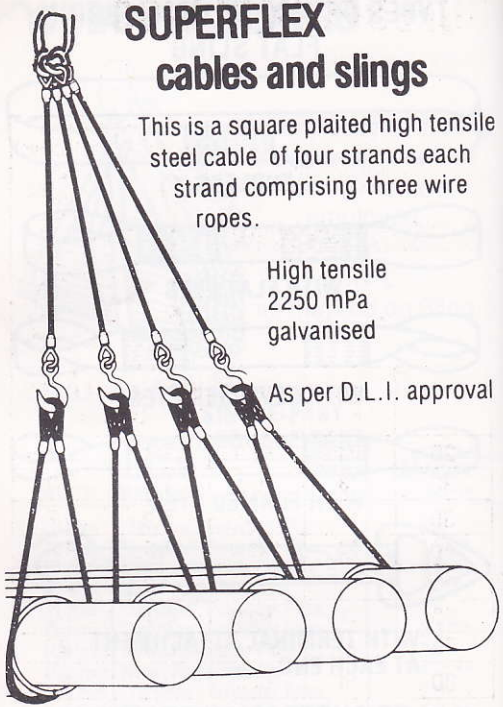
TO AUSTRALIAN STANDARD

AS 1353 — 1974

TESTED LIFTING GEAR

A. NOBLE & SON LTD.

SUPERFLEX cables and slings



This is a square plaited high tensile steel cable of four strands each strand comprising three wire ropes.

High tensile
2250 mPa
galvanised

As per D.L.I. approval

Because of the use of high tensile materials Superflex cable makes the lightest, strongest and most flexible of all steel slings.

Superflex slings have been found to possess enormous gripping power, because they contact the load so closely. Loads do not slip out of Superflex slings, even if it is a big sling on a small load.

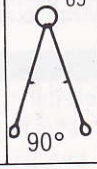
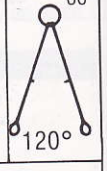
A. NOBLE & SON LTD.

SUPERFLEX SLINGS

Cable details			snotter – single fall	snotter – basket hitch
				
number	size m.m. dia.	strength kN	WORKING LOADS tonnes	
25	11	52.9	1.1	2.1
30	13	75.6	1.5	2.9
35	15	110	1.9	3.7
40	17	123.0	2.5	4.9
45	19	186	3.2	6.2
50	21	199.0	4.1	8.0
65	26	310.0	6.3	12.2
80	36	462.0	9.4	18.2

A. NOBLE & SON LTD.

SUPERFLEX SAFE WORKING LOADS in tonnes

 number ①	 snotter – choked round 63	 two-leg assembly 65 60°	 two-leg assembly 65 90°	 two-leg assembly 66 120°
25	0.8	1.9	1.6	1.1
30	1.1	2.6	2.1	1.5
35	1.4	3.3	2.7	1.9
40	1.9	4.3	3.5	2.5
45	2.4	5.5	4.5	3.2
50	3.1	7.1	5.6	4.1
65	4.7	10.9	8.9	6.3
80	7.1	16.3	13.3	9.4

CHAIN

"SUITABLE FOR LIFTING"

GRADE L

GRADE P

Herc-Alloy Grade T

KUPLEX

FRAM ALLOY

NOT SUITABLE FOR INDUSTRIAL LIFTING:–

PROOF COIL CHAIN

CHAIN GRADE L

supersedes our "BBB-30" Mild Steel chain;

IDENTIFICATION – Stamped [L]

FINISH –
Self-Color, Polished or Hot-Dip Galvanised.
Other finishes available on application.

CHAIN SIZE (mm)	W.L.L.* (TONNES)	LINKS PER METRE	METRES PER 100 kg	
			SELF COLOR	HOT-DIP GALVAN.
5	0.25	68.3	182	174
6	0.40	54.2	115	109
8	0.64	42.7	71.3	69.2
10	1.00	34.1	46.0	43.5
13	1.70	26.3	26.3	25.6
16	2.58	21.3	17.7	17.0
20	4.03	17.1	11.6	11.2
22	4.8	17.5	9.0	8.7
24	5.81	14.2	7.8	7.5

*The Working Load Limit (W.L.L.) is the maximum mass which the chain hanging vertically shall support in general service.

TEST CERTIFICATES are available on request

CHAIN GRADE P

supersedes our "HT-40" Higher Tensile chain;

IDENTIFICATION – Stamped [P]

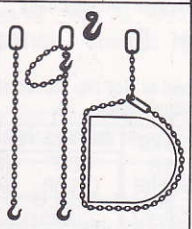
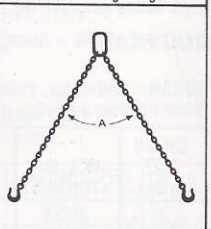
FINISH – Self-Color, Polished or Hot-Dip Galvanised.
Other finishes available on application.

CHAIN SIZE (mm)	W.L.L.* (TONNES)	LINKS PER METRE	METRES PER 100 kg	
			SELF COLOR	HOT-DIP GALVAN.
5	0.50	68.3	180	171
6	0.79	54.2	114	108
8	1.28	42.7	71.4	68.9
10	2.00	34.1	48.1	46.3
13	3.38	26.3	28.0	27.2
16	5.12	21.3	18.3	17.9
20	8.00	17.1	12.0	11.6
24	11.5	14.2	8.2	8.0

*The Working Load Limit (W.L.L.) is the maximum mass which the chain hanging vertically shall support in general service.

TEST CERTIFICATES are available on request.

PWB Herc-Alloy Grade T

	Single Leg Slings – Tonnes			2, 3, or 4 Leg Slings		
						
Chain Size Inches	Straight Sling	Adjustable Sling	Reeved Sling 120° Max	Straight Sling 60°	90°	120°
7/32	1.0	0.7	0.7	1.7	1.4	1.0
9/32	1.6	1.2	1.2	2.8	2.3	1.6
3/8	2.9	2.1	2.1	5.0	4.1	2.9
1/2	5.1	3.8	3.8	8.9	7.3	5.1
5/8	8.0	6.0	6.0	13.9	11.4	8.0
3/4	11.6	8.7	8.7	20.1	16.4	11.6
7/8	15.8	11.8	11.8	27.4	22.3	15.8
1	20.6	15.5	15.5	35.7	29.2	20.6
1-1/4	32.2	24.2	24.2	55.9	45.6	32.2

SYMBOL, SWL APPLIES TO BOTH RECTANGULAR AND CIRCULAR SHAPED LOADS.

SYMBOL. THE SWL HAS ALREADY BEEN REDUCED TO COMPENSATE FOR GRAB HOOK. WHERE NO HOOK SYMBOL IS SHOWN THEN RATING MUST BE REDUCED BY 25% IF A GRAB HOOK IS USED.

Sling Hook

Safety Hook

A. NOBLE & SON LTD.

TABLE OF SAFE WORKING LOADS

(In Tonnes of 1000 kg)

	2, 3, or 4 Leg Slings			Endless Slings			
							
Chain Size Inches	Reeved Sling 60°	90°	120°	Basket Sling 60°	90°	120°	Reeved Sling 120° Max
7/32	1.3	1.0	0.7	1.1	0.90	0.65	1.3
9/32	2.1	1.7	1.2	1.8	1.5	1.0	2.1
3/8	3.7	3.0	2.1	3.3	2.7	1.9	3.7
1/2	6.7	5.4	3.8	5.9	4.8	3.4	6.7
5/8	10.4	8.5	6.0	9.2	7.5	5.3	10.4
3/4	15.1	12.3	8.7	13.2	10.8	7.6	15.1
7/8	20.5	16.7	11.8	18.0	14.7	10.4	20.5
1	26.8	21.9	15.5	23.6	19.2	13.6	26.8
1-1/4	41.9	34.2	24.2	36.9	30.1	21.3	41.9

THE ABOVE SAFE WORKING LOAD LIMITS ARE FOR NORMAL CONDITIONS OF USE, AS DEFINED BY CLASS 3 APPLICATIONS IN THE S.A.A. CRANE AND HOIST CODE CB2-1960. THEY MUST NEVER BE EXCEEDED, EVEN AT ANGLES LESS THAN 60°. FOR HAZARDOUS CONDITIONS (E.G. CLASS 4 APPLICATIONS) THE SWL MUST BE REDUCED BY AT LEAST 20%.

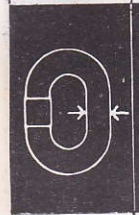
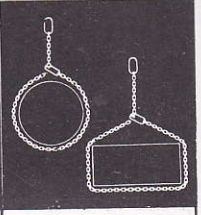
Latchlok Hook

Choker Hook

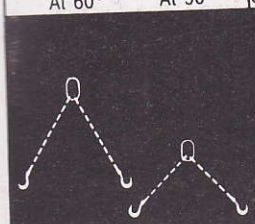
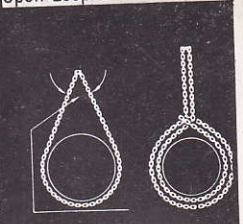
A. NOBLE & SON LTD.

KUPLEX® Slings

Grade T Maximum Safe Working Loads (Tonnes of 1,000 kg)

Chain Size mm	Single Hook or Reevable Collar Slings	
	Not Back Hooked	Reeved on Circular or Rectangular Load
		
7	1.5	1.1
8	2.0	1.5
10	3.2	2.4
13	5.4	4.0
16	8.0	6.0
19	11.5	8.6
23	16.9	12.6
26	21.6	16.2
32	32.0	24.0

"KUPLEX" GRADE 'T' CHAIN

2, 3 or 4 Leg Slings –		Endless Slings
At 60°	At 90°	Open Loop Circular Loads
		

Chain			60°	90°	
7	2.5	2.1	1.7	1.4	1.9
8	3.4	2.8	2.2	1.8	2.6
10	5.4	4.5	3.6	2.9	4.2
13	9.2	7.5	6.0	4.9	7.1
16	13.6	11.2	8.9	7.3	10.5
19	19.5	16.1	12.9	10.6	15.2
23	28.7	23.6	18.9	15.5	22.3
26	36.7	30.2	24.2	19.8	28.5
32	54.4	44.8	35.8	29.4	42.2

S.W.L. at 60° – must never be exceeded, even at smaller angles.
S.W.L. at other angles – may be interpolated between the loads shown at 60° and 120°
Flexible loads – above ratings must not be exceeded even if the load is flexible.

DISCARD FACTORS ON CHAIN

Inspection:

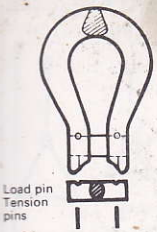
It is important to inspect chain slings regularly and to keep a record for each chain sling. Chain sling inspection record cards are available from PWB Herc-Alloy distributors free of charge.

1. If necessary, clean the sling before inspection.
2. Every chain link should be individually inspected for any signs of wear, twisting, stretching, nicks or gouging, and any work link measured to determine degree of wear.
3. Oblong links and hooks should be inspected for any signs of wear at their loadbearing points and for any signs of distortion e.g. widening of hook throat opening.
4. Hammerloks should be inspected for any signs of wear at their loadbearing points, for excessive play of the load pin within the body halves and for impaired rotation of the body halves around the load pin.
5. Chain links or fittings having any defects should be clearly marked to indicate rejection, and the chain sling withdrawn from service until properly repaired.
6. Slings which have damaged fittings may be repaired on-site by replacing the fittings. (Note: when reassembling a Hammerlok it is recommended that a new pin and stud assembly be used.) Any damaged chain must be discarded.
7. Enter all results in the sling record card.

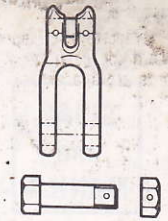
Chain wear allowances

Chain size		Minimum permissible diameters	
inches	(mm)	Crown (mm)	Elsewhere (mm)
7/32	(5.6)	4.5	4.8
9/32	(7.1)	5.7	6.0
3/8	(9.5)	7.6	8.1
1/2	(12.7)	10.2	10.8
5/8	(15.9)	12.7	13.4
3/4	(19.0)	15.2	16.1
7/8	(22.2)	17.8	18.9
1	(25.4)	20.3	21.6
1-1/4	(31.7)	25.4	26.9

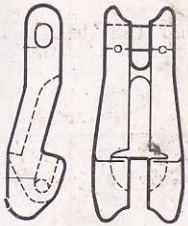
'KUPLER'



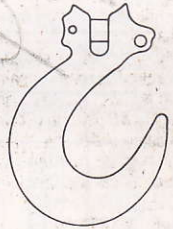
'KUPLEX' SHACKLE



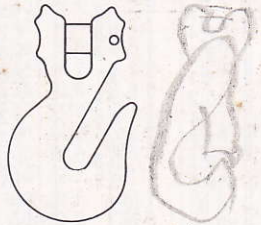
'KUPLEX' SHORTENING CLUTCH



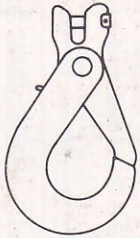
PINLOK SLING HOOK



PINLOK GRAB HOOK



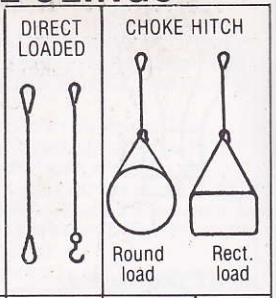
PINLOK LATCHLOK HOOK



FIBRE-ROPE SLINGS

AS 1380 - 1972

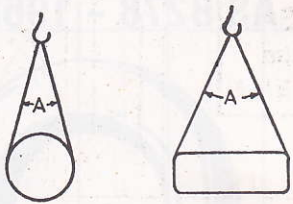
SISAL and MANILA



Included angle A		—	—	—
Loading factor		1.00	0.75	0.50
Nominal Size		SAFE WORKING LOAD		
circ. in.	dia. mm			
1½	12	150	110	70
2	16	290	220	140
2½	20	460	350	230
3	24	660	490	330
3½	28	880	660	440
4	32	1.1	850	560
5	40	1.7	1.2	850
6	48	2.4	1.8	1.2
7	56	3.2	2.4	1.6
8	65	4.1	3.1	2.0
9	72	5.2	3.9	2.6
10	80	6.4	4.8	3.2
11	90	7.7	5.7	3.8
12	100	9.1	6.8	4.5
14	115	12.2	9.2	6.1
16	130	16.0	12.0	8.0
18	150	20.1	15.1	10.0

A. NOBLE & SON LTD.

FIBRE-ROPE SLINGS

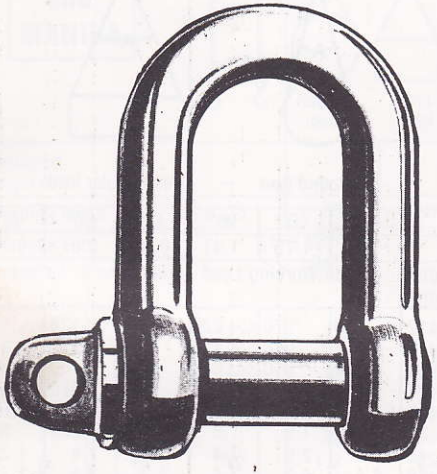


	45°	60°	90°	45°	60°	90°
	1.85	1.73	1.41	0.92	0.87	0.71
dia. mm	Safe Working Load – kilograms or tonnes					
12	280	270	220	140	130	110
16	540	510	410	270	250	200
20	860	810	660	430	400	330
24	1.2	1.1	930	610	570	470
28	1.6	1.5	1.2	810	760	620
32	2.0	1.9	1.6	1.0	980	800
40	3.1	2.9	2.4	1.5	1.4	1.2
48	4.4	4.1	3.4	2.2	2.1	1.7
56	6.0	5.6	4.6	3.0	2.8	2.3
65	7.7	7.2	5.9	3.8	3.6	2.9
72	9.6	9.0	7.3	4.8	4.5	3.6
80	11.8	11.1	9.0	5.9	5.5	4.5
90	14.2	13.3	10.8	7.1	6.6	5.4
100	16.8	15.8	12.9	8.4	7.9	6.4
115	22.7	21.2	17.3	11.3	10.6	8.6
130	29.6	27.7	22.6	14.8	13.8	11.3
150	37.2	34.9	28.5.	18.6	17.4	14.2

A. NOBLE & SON LTD.

SHACKLES

FOR LIFTING PURPOSES AS B278 - 1968



LARGE DEE SHACKLE WITH SCREWED PIN

Mild Steel Shackles

B.S. 825: 1949 – Table 2 (A.S. B278: 1968 – Table 2)
TESTED AND STAMPED
SUPPLIED WITH TEST CERTIFICATE

A. NOBLE & SON LTD.

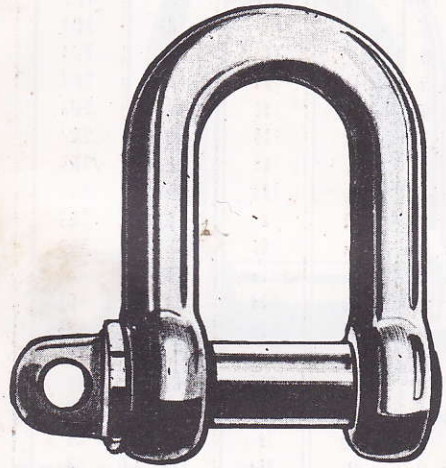
LARGE DEE SHACKLE WITH SCREWED PIN, MILD STEEL

SAFE WORKING LOAD tons	cwts.	BODY DIAMETER d	PIN DIAMETER D	INSIDE LENGTH L	INSIDE WIDTH W
	8	$\frac{3}{8}$	$\frac{1}{2}$	$1\frac{1}{2}$	$\frac{3}{4}$
	12	$\frac{1}{2}$	$\frac{3}{8}$	$2\frac{1}{8}$	$1\frac{1}{8}$
1	2	$\frac{5}{8}$	$\frac{3}{4}$	$2\frac{1}{2}$	$1\frac{1}{4}$
1	12	$\frac{3}{4}$	$\frac{7}{8}$	$2\frac{7}{8}$	$1\frac{1}{2}$
2	5	$\frac{7}{8}$	1	$3\frac{1}{4}$	$1\frac{3}{4}$
3	0	1	$1\frac{1}{8}$	$3\frac{3}{4}$	2
3	15	$1\frac{1}{8}$	$1\frac{1}{4}$	$4\frac{1}{8}$	$2\frac{1}{8}$
4	10	$1\frac{1}{4}$	$1\frac{3}{8}$	$4\frac{1}{2}$	$2\frac{3}{8}$
5	10	$1\frac{3}{8}$	$1\frac{1}{2}$	5	$2\frac{5}{8}$
6	10	$1\frac{1}{2}$	$1\frac{5}{8}$	$5\frac{3}{8}$	$2\frac{3}{4}$
7	10	$1\frac{5}{8}$	$1\frac{3}{4}$	$5\frac{3}{4}$	3
8	10	$1\frac{3}{4}$	$1\frac{7}{8}$	$6\frac{1}{8}$	$3\frac{1}{4}$
11	0	$1\frac{7}{8}$	$2\frac{1}{8}$	7	$3\frac{5}{8}$
12	5	2	$2\frac{1}{4}$	$7\frac{3}{8}$	$3\frac{7}{8}$
13	10	$2\frac{1}{8}$	$2\frac{3}{8}$	$7\frac{3}{4}$	$4\frac{1}{8}$
15	0	$2\frac{1}{4}$	$2\frac{1}{2}$	$8\frac{1}{4}$	$4\frac{1}{4}$
16	10	$2\frac{3}{8}$	$2\frac{5}{8}$	$8\frac{3}{4}$	$4\frac{1}{2}$
20	0	$2\frac{5}{8}$	$2\frac{7}{8}$	$9\frac{1}{2}$	5
25	0	$2\frac{7}{8}$	$3\frac{1}{4}$	$10\frac{3}{4}$	$5\frac{1}{2}$
30	0	$3\frac{1}{8}$	$3\frac{1}{2}$	$11\frac{1}{2}$	$5\frac{7}{8}$
35	0	$3\frac{3}{8}$	$3\frac{3}{4}$	$12\frac{1}{2}$	$6\frac{1}{4}$
40	0	$3\frac{5}{8}$	$4\frac{1}{8}$	$13\frac{1}{2}$	7
50	0	4	$4\frac{1}{2}$	$14\frac{3}{4}$	$7\frac{1}{2}$
60	0	$4\frac{1}{2}$	5	$16\frac{1}{2}$	$8\frac{5}{8}$
80	0	$5\frac{1}{2}$	$5\frac{3}{4}$	$18\frac{3}{4}$	$9\frac{7}{8}$

A. NOBLE & SON LTD.

SHACKLES
FOR LIFTING PURPOSES AS B278 – 1968

SMALL DEE SHACKLE WITH SCREWED PIN



Mild Steel Shackles

B.S. 825: 1949 – Table 1 (A.S. B278: 1968 – Table 1)
TESTED AND STAMPED
SUPPLIED WITH TEST CERTIFICATE

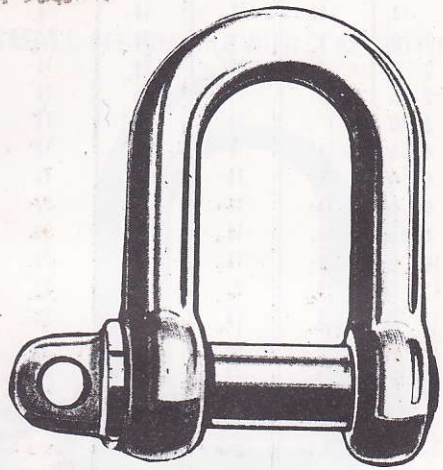
A. NOBLE & SON LTD.

SMALL DEE SHACKLE WITH SCREWED PIN
MILD STEEL AS B278-1968

SAFE WORKING LOAD tons cwts.	BODY DIAMETER d	PIN DIAMETER D	INSIDE LENGTH L	INSIDE WIDTH W
10	3/8	1/2	1 3/8	5/8
17	1/2	5/8	1 7/8	7/8
1 8	5/8	3/4	2 1/4	1
2 0	3/4	7/8	2 3/4	1 1/4
2 15	7/8	1	3 1/4	1 3/8
3 10	1	1 1/8	3 5/8	1 1/2
4 5	1 1/8	1 1/4	4 1/8	1 3/4
5 5	1 1/4	1 3/8	4 1/2	1 7/8
7 0	1 3/8	1 5/8	5	2 1/8
8 10	1 1/2	1 3/4	5 1/2	2 3/8
10 0	1 5/8	1 7/8	5 7/8	2 1/2
11 0	1 3/4	2	6 3/8	2 3/4
12 10	1 7/8	2 1/8	6 3/4	2 7/8
14 0	2	2 1/4	7 1/4	3
15 10	2 1/8	2 3/8	7 3/4	3 1/4
17 0	2 1/4	2 1/2	8 1/8	3 1/2
20 0	2 3/8	2 3/4	8 5/8	3 5/8
25 0	2 5/8	3	9 1/2	4
30 0	2 7/8	3 1/4	10 3/8	4 3/8
35 0	3 1/8	3 3/8	11 1/4	4 7/8
40 0	3 3/8	3 7/8	12 1/4	5 1/4
50 0	3 5/8	4 1/4	13 3/8	5 1/2
60 0	4	4 5/8	14 1/2	6 1/8
80 0	4 5/8	5 1/4	16 3/4	6 7/8

A. NOBLE & SON LTD.

SHACKLES
FOR LIFTING PURPOSES AS B278 - 1968



LARGE DEE SHACKLES

Higher Tensile Steel Shackles

B.S. 3032: 1958 – Table 1 (A.S. B278: 1968 – Table 1)
TESTED AND STAMPED
SUPPLIED WITH TEST CERTIFICATE

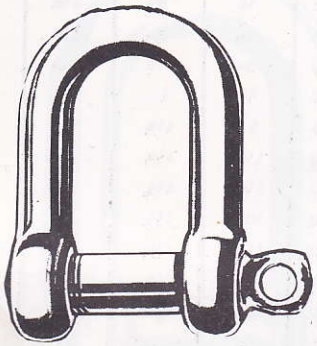
A. NOBLE & SON LTD.

Higher Tensile LARGE DEE SHACKLES

SAFE WORKING LOAD tons	cwts	BODY DIAMETER d	PIN DIAMETER D	INSIDE LENGTH L	INSIDE WIDTH W
	5	1/4	3/8	1	1/2
	10	3/8	1/2	1 1/2	3/4
	15	1/2	5/8	2 1/8	1 1/8
1	10	5/8	3/4	2 1/2	1 1/4
2	0	3/4	7/8	2 7/8	1 1/2
3	0	7/8	1	3 1/4	1 3/4
3	15	1	1 1/8	3 3/4	2
5	0	1 1/8	1 1/4	4 1/8	2 1/8
6	0	1 1/4	1 3/8	4 1/2	2 3/8
7	0	1 3/8	1 1/2	5	2 5/8
9	10	1 1/2	1 3/4	5 3/8	2 3/4
11	5	1 5/8	1 7/8	5 3/4	3
13	0	1 3/4	2	6 1/8	3 1/4
14	5	1 7/8	2 1/8	7	3 5/8
16	5	2	2 1/4	7 3/8	3 7/8
18	0	2 1/8	2 3/8	7 3/4	4 1/8
20	0	2 1/4	2 1/2	8 1/4	4 1/4
25	0	2 1/2	2 7/8	9 1/4	4 3/4
30	0	2 3/4	3 1/8	10 1/4	5 1/4
35	0	3	3 3/8	11	5 3/4
40	0	3 1/8	3 1/2	11 1/2	5 7/8
50	0	3 1/2	4	13	6 3/4
65	0	4	4 1/2	14 3/4	7 1/2
80	0	4 1/2	5	16 1/2	8 3/8

A. NOBLE & SON LTD.

SHACKLES
FOR LIFTING PURPOSES AS B278 - 1968



SMALL DEE SHACKLES

Higher Tensile
Steel Shackles

B.S. 3032: 1958 – Table 2 (A.S. B278: 1968 – Table 2)
TESTED AND STAMPED
SUPPLIED WITH TEST CERTIFICATE

A. NOBLE & SON LTD.

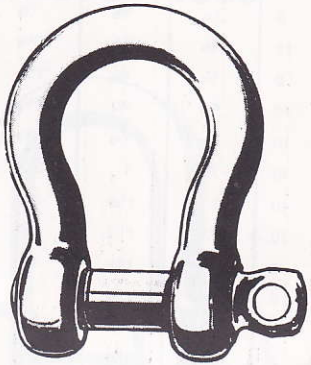
Higher Tensile SMALL DEE SHACKLES

SAFE WORKING LOAD tons	cwts	BODY DIAMETER d	PIN DIAMETER D	INSIDE LENGTH L	INSIDE WIDTH W
	6	1/4	3/8	7/8	3/8
	12	3/8	1/2	1 3/8	5/8
1	0	1/2	5/8	1 7/8	7/8
1	15	5/8	3/4	2 1/4	1
2	10	3/4	7/8	2 3/4	1 1/4
3	10	7/8	1	3 1/4	1 3/8
4	10	1	1 1/8	3 5/8	1 1/2
5	10	1 1/8	1 1/4	4 1/8	1 3/4
7	0	1 1/4	1 3/8	4 1/2	1 7/8
8	0	1 3/8	1 1/2	5	2 1/8
10	15	1 1/2	1 3/4	5 1/2	2 3/8
13	0	1 5/8	1 7/8	5 7/8	2 1/2
14	15	1 3/4	2	6 3/8	2 3/4
16	15	1 7/8	2 1/8	6 3/4	2 7/8
19	0	2	2 1/4	7 1/4	3
20	0	2 1/8	2 3/8	7 3/4	3 1/4
25	0	2 3/8	2 3/4	8 5/8	3 5/8
30	0	2 1/2	2 7/8	9	3 7/8
35	0	2 3/4	3 1/8	10	4 1/4
40	0	2 7/8	3 1/4	10 3/8	4 3/8
50	0	3 1/4	3 3/4	11 3/4	5
65	0	3 5/8	4 1/4	13 1/8	5 1/2
80	0	4	4 5/8	14 1/2	6 1/8

A. NOBLE & SON LTD.

HIGH LOAD SHACKLES

to U.S. Federal Specifications



SCREW PIN ANCHOR

SAMPLES ARE REGULARLY TESTED TO DESTRUCTION.

MINIMUM BREAKING LOAD REQUIREMENT IS 6 TIMES THE SPECIFIED SAFE WORKING LOAD.

•CAPACITIES ⅓ to 130 TONS.

A. NOBLE & SON LTD.

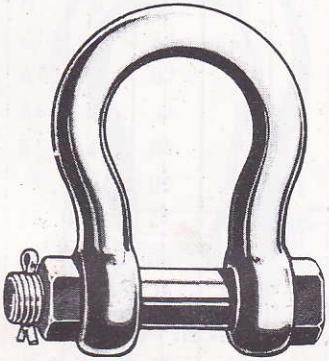
SCREW PIN ANCHOR

SAFE WORKING LOAD U.S. tons	BODY DIA. d	PIN DIA. D	INSIDE LENGTH L (MIN.)	INSIDE WIDTH AT PIN W	INSIDE WIDTH AT BOW B	OUTSIDE OF EYE DIA. (MAX.)
⅓	3/16	1/4	7/8	3/8	19/32	9/16
½	1/4	5/16	1 1/8	15/32	25/32	11/16
¾	5/16	3/8	1 7/32	17/32	27/32	13/16
1	3/8	7/16	1 7/16	21/32	1 1/32	31/32
1½	7/16	1/2	1 11/16	23/32	1 5/32	1 1/16
2	1/2	5/8	1 7/8	13/16	1 5/16	1 1/16
3¼	5/8	3/4	2 13/32	1 1/16	1 11/16	1 9/16
4¾	3/4	7/8	2 27/32	1 1/4	2	1 7/8
6½	7/8	1	3 5/16	1 7/16	2 9/32	2 1/8
8½	1	1 1/8	3 3/4	1 11/16	2 11/16	2 3/8
9½	1 1/8	1 1/4	4 1/4	1 13/16	2 29/32	2 5/8
12	1 1/4	1 3/8	4 11/16	2 1/32	3 1/4	3
13½	1 3/8	1 1/2	5 1/4	2 1/4	3 5/8	3 5/16
17	1 1/2	1 5/8	5 3/4	2 3/8	3 7/8	3 5/8
25	1 3/4	2	7	2 7/8	5	4 5/16
35	2	2 1/4	7 3/4	3 1/4	5 3/4	5
45	2 1/4	2 1/2	8 3/4	3 3/4	5 1/2	5 5/8
55	2 1/2	2 3/4	10 1/2	4 1/8	7 1/4	6
70	2 3/4	3	12	4 1/2	7 5/8	6 5/16
85	3	3 1/4	13	5	7 7/8	7
120	3 1/2	3 3/4	15	5 3/4	9 1/2	8

A. NOBLE & SON LTD.

HIGH LOAD SHACKLES

to U.S. Federal Specifications



SAFETY ANCHOR

- SAFE WORKING LOAD PERMANENTLY SHOWN ON EVERY SHACKLE.
- FORGED, QUENCHED AND TEMPERED, WITH ALLOY PINS.
- CAPACITIES ⅓ to 130 TONS.

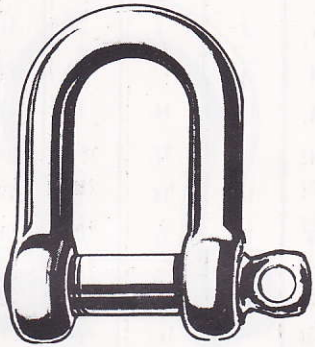
A. NOBLE & SON LTD.

SAFETY ANCHOR

SAFE WORKING LOAD U.S. tons	BODY DIAMETER d	PIN DIAMETER D	INSIDE LENGTH L (MIN.)	INSIDE WIDTH AT PIN W	OUTSIDE OF EYE DIAMETER (MAX.
2	½	⅝	1⅞	13/16	1 1/16
3¼	⅝	¾	2 13/32	1 1/16	1 9/16
4¾	¾	⅞	2 27/32	1¼	1⅞
6½	⅞	1	3 5/16	1 7/16	2⅛
8½	1	1⅛	3¾	1 11/16	2⅝
9½	1⅛	1¼	4⅛	1 13/16	2⅝
12	1¼	1⅜	4 11/16	2 1/32	3
13½	1⅜	1½	5⅛	2¼	3 5/16
17	1½	1⅝	5¾	2⅜	3⅝
25	1¾	2	7	2⅞	4 5/16
35	2	2¼	7¾	3⅛	5
45	2¼	2½	8¾	3½	5⅝
55	2½	2¾	10½	4⅛	6
70	2¾	3	12	4½	6 5/16
85	3	3¼	13	5	7
120	3½	3¾	15	5¾	8
150	4	4¼	17	6½	9¼

A. NOBLE & SON LTD.

HIGH LOAD SHACKLES



SCREW PIN CHAIN

SHACKLES ARE FORGED FROM FORGING QUALITY STEELS AND HEAT TREATED.

SHACKLES ARE PROOF TESTED TO 2.2 TIMES THE SAFE WORKING LOAD.

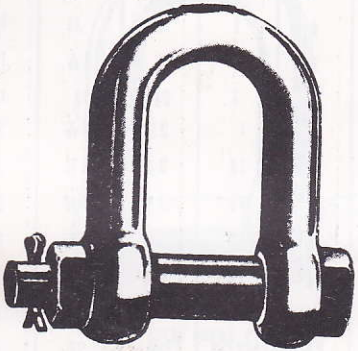
A. NOBLE & SON LTD.

SCREW PIN CHAIN

SAFE WORKING LOAD U.S. tons	BODY DIAMETER d	PIN DIAMETER D	INSIDE LENGTH L (MIN.)	INSIDE WIDTH AT PIN W	OUTSIDE OF EYE DIAMETER (MAX.)
½	¼	5/16	⅞	15/32	11/16
¾	5/16	⅜	1 1/32	17/32	11/16
1	⅜	7/16	1¼	21/32	31/32
1½	7/16	½	1 7/16	23/32	1 1/16
2	½	⅝	1⅝	13/16	1 5/16
3¼	⅝	¾	2	1 1/16	1 9/16
4½	¾	⅞	2⅜	1¼	1⅞
6½	⅞	1	2 13/16	1 7/16	2⅛
8½	1	1⅛	3 3/16	1 11/16	2⅜
9½	1⅛	1¼	3 9/16	1 13/16	2⅝
12	1¼	1⅜	3 15/16	2 1/32	3
13½	1⅜	1½	4 7/16	2¼	3 5/16
17	1½	1⅝	4⅞	2⅜	3⅝
25	1¾	2	5½	2⅞	4 5/16
35	2	2¼	6¾	3½	5
45	2¼	2½	7⅞	3¾	5⅝
55	2½	2¾	8	4⅛	6
70	2¾	3	8½	4½	6 5/16
85	3	3¼	8½	5	7
120	3½	3¾	10½	5¾	8

A. NOBLE & SON LTD.

HIGH LOAD SHACKLES to U.S. Federal Specifications



SAFETY CHAIN

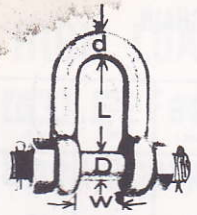
APART FROM LISTED SHACKLES WE ARE PREPARED TO DESIGN AND PRODUCE SHACKLES TO SPECIAL DIMENSIONAL AND CAPACITY REQUIREMENTS UP TO 1000 TONS S.W.L.

A. NOBLE & SON LTD.

SAFETY CHAIN

SAFE WORKING LOAD U.S. tons	BODY DIAMETER d	PIN DIAMETER D	INSIDE LENGTH L (MIN.)	INSIDE WIDTH AT PIN W	OUTSIDE OF EYE DIAMETER (MAX.
2	1/2	5/8	1 7/8	13/16	1 5/16
3 1/4	5/8	3/4	2 13/32	1 1/16	1 9/16
4 3/4	3/4	7/8	2 27/32	1 1/4	1 7/8
6 1/2	7/8	1	3 5/16	1 7/16	2 1/8
8 1/2	1	1 1/8	3 3/4	1 11/16	2 3/8
9 1/2	1 1/8	1 1/4	4 1/4	1 13/16	2 5/8
12	1 1/4	1 3/8	4 11/16	2 1/32	3
13 1/2	1 3/8	1 1/2	5 1/4	2 1/4	3 5/16
17	1 1/2	1 5/8	5 3/4	2 3/8	3 3/8
25	1 3/4	2	7	2 7/8	4 5/16
35	2	2 1/4	7 3/4	3 1/4	5
45	2 1/4	2 1/2	8 3/4	3 3/4	5 5/8
55	2 1/2	2 3/4	10 1/2	4 1/8	6
70	2 3/4	3	12	4 1/2	6 5/16
85	3	3 1/4	13	5	7
120	3 1/2	3 3/4	15	5 3/4	8
150	4	4 1/4	17	6 1/2	9 1/4

A. NOBLE & SON LTD.



'High Capacity' Safety Chain Shackles

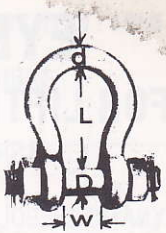
(Finish: Self Colour or Painted)

Dimensions in mm (and inches)

SAFE WORKING LOAD U.S. Tons	BODY DIAMETER d.	PIN DIAMETER D	INSIDE LENGTH L (MIN.)	INSIDE WIDTH AT THE PIN W	ORDERING CODE	APPROX. WEIGHT EACH KGS.
3	13	16	41	21	HCC13	0.35
4	16	19	50	27	HCC16	0.73
6	19	22	60	32	HCC19	1.23
8	22	25	71	36	HCC22	1.7
10	25	28	80	43	HCC25	2.5
12	28	32	90	46	HCC28	3.4
15	32	35	100	52	HCC32	4.7
20	35	38	112	57	HCC35	6.2
30	38	45	125	60	HCC38	8.4
40	45	50	150	73	HCC45	13
50	50	55	200	85	HCC50	20
80	65	70	250	110	HCC65	40
120	80	82.5	300	130	HCC80	70
150	90	95	350	150	HCC90	115
175	105	110	400	165	HCC105	170
200	110	120	450	175	HCC110	200
250	120	130	500	200	HCC120	280
300	130	145	550	210	HCC130	350
400	145	155	600	225	HCC145	500
500	155	170	650	250	HCC155	600
750	205	215	700	340	HCC205	1350
1000	245	255	850	395	HCC245	2260

'High Capacity' Safety Anchor Shackles

(Finish: Self Colour or Painted)

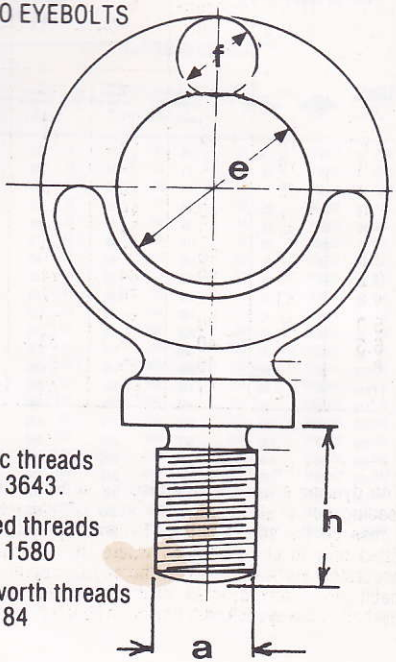


Dimensions in mm (and inches)

SAFE WORKING LOAD U.S. Tons	BODY DIAMETER d.	PIN DIAMETER D	INSIDE LENGTH L (MIN.)	INSIDE WIDTH AT THE PIN W	BOW DIAMETER B (MIN.)	ORDERING CODE	APPROX. WEIGHT EACH KGS.
3	13	16	48	21	33	HCA13	
4	16	19	61	27	43	HCA16	
6	19	22	72	32	50	HCA19	
8	22	25	84	36	58	HCA22	
10	25	28	95	43	68	HCA25	
12	28	32	110	46	74	HCA28	
15	32	35	120	52	82	HCA32	
20	35	38	135	57	92	HCA35	
30	38	45	150	60	98	HCA38	
40	45	50	180	73	127	HCA45	
50	50	55	250	85	160	HCA50	
80	65	70	320	110	200	HCA65	
120	80	82.5	390	130	250	HCA80	
150	90	95	435	150	280	HCA90	
175	105	110	460	165	300	HCA105	
200	110	120	520	175	330	HCA110	
250	120	130	575	200	360	HCA120	
300	130	145	650	210	400	HCA130	
400	145	155	710	225	450	HCA145	
500	155	170	775	250	500	HCA155	
750	205	215	830	340	585	HCA205	
1000	245	255	990	395	740	HCA245	

EYEBOLTS
FOR LIFTING PURPOSES
BS 4278 - 1968

DYNAMO EYEBOLTS



(1) Metric threads to BS 3643.

(2) Unified threads to BS 1580

(3) Whitworth threads to BS 84

NOTE. Eyebolts threaded to (2) and (3) above are obsolescent and should only be specified for replacement purposes for existing plant.

EYEBOLT DIMENSIONS

Safe working load (vertical)	Metric thread	Basic unit of measurement A*	E = 2.20A	F = 0.83A	H = 1.75A
tonnef	mm	mm	mm	mm	mm
0.32	12	10	22	9	18
0.63	16	13	29	11	23
1.0	18	16	35	14	28
1.25	20	18	40	15	32
1.6	22	20	44	17	35
2.0	24	23	51	19	40
2.5	27	26	57	22	46
3.2	30	29	64	24	51
4.0	33	32	70	27	56
5.0	36	36	79	30	63
6.3	39	40	88	33	70
8	45	45	99	37	79
10	52	51	112	42	89

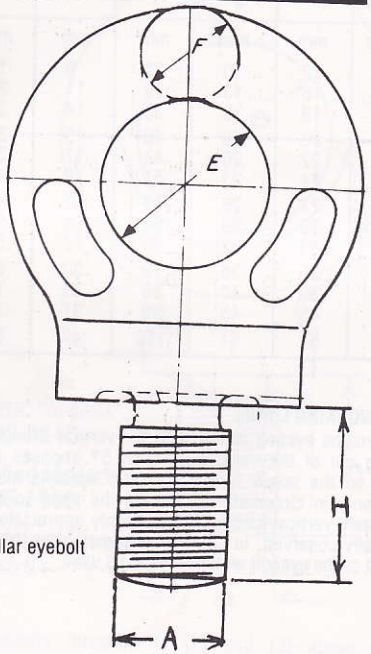
SAFE WORKING LOADS

The dynamo eyebolt is intended for vertical lifting only; loading out of the vertical by even 5° imposes undue stress on the screw thread. Dynamo eyebolts must be fitted only in circumstances where the need to ensure accurately vertical loading is thoroughly appreciated and habitually observed; in all other circumstances the collar eyebolt or the eyebolt with link must be used.

A. NOBLE & SON LTD.

EYEBOLTS
FOR LIFTING PURPOSES
BRITISH STANDARD BS 4278 : 1968

METRIC



Collar eyebolt

A. NOBLE & SON LTD.

METRIC

COLLAR EYEBOLTS

Safe working load (vertical)	Metric thread A	DIMENSIONS E	F	H
tonnef	mm	mm	mm	mm
0.32	12	15	9	18
0.63	16	20	12	23
1.0	18	24	14	28
1.25	20	27	16	32
1.6	22	30	18	35
2.0	24	35	21	40
2.5	27	39	23	46
3.2	30	44	26	51
4.0	33	48	29	56
5.0	36	54	32	63
6.3	39	60	36	70
8.0	45	68	40	79
10.0	52	76	46	89
12.5	56	86	51	100
16	64	96	58	112
20	70	108	65	126
25	76	120	72	140

A. NOBLE & SON LTD.

EYEBOLTS BS 4278 : 1968

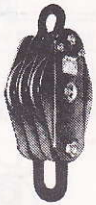
SAFE WORKING LOADS ON PAIRS OF EYEBOLTS:- METRIC UNITS

	Maximum load W to be lifted by a pair of eyebolts when the angle between the sling leg is ϕ		
	$0 < \phi < 30°$	$30° < \phi < 60°$	$60° < \phi < 90°$
tonnef	tonnef	tonnef	tonnef
1.0	1.3	0.80	0.50
1.25	1.6	1.0	0.63
1.6	2.0	1.25	0.80
2.0	2.5	1.6	1.0
2.5	3.2	2.0	1.25
3.2	4.0	2.5	1.6
4.0	5.0	3.2	2.0
5.0	6.3	4.0	2.5
6.3	8.0	5.0	3.2
8.0	10	6.3	4.0
10.0	12.5	8.0	5.0
12.5	16	10	6.3
16	20	12.5	8.0
20	25	16	10
25	32	20	12.5
Reduction factor	0-63	0-40	0-25
0°	30°	60°	90°

SHEAVE AND SNATCH BLOCKS

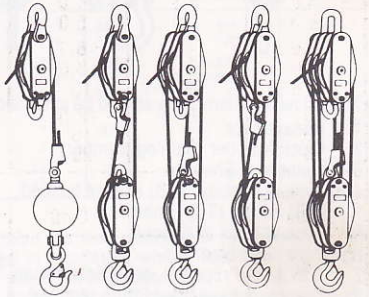
NSB
(Open)

NSL
(Double)



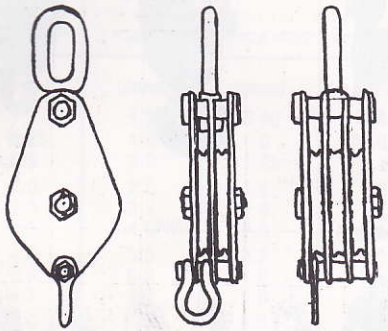
NSF
(Triple)

NSF
(Quadruple)



1 PART OF LINE | 2 PARTS OF LINE | 3 PARTS OF LINE | 4 PARTS OF LINE | 5 PARTS OF LINE

SHEAVE AND SNATCH BLOCKS
AS 2089 - 1977



The following information should be specified:

1. Sheave Size.
2. Block Number (Catalog Number).
3. Number of Sheaves.
4. Type of Bearing: (BB) Bronze bushed, (RB) Roller, (TB) Timken.
5. Type of Hook or Shackle.
6. Wire Rope Diameter.
7. S.W.L. per rope fall, or on head fitting.
8. Swivel, or fixed head fitting required.
9. If becket required.
10. State class of crane or nature of duty.

SHEAVE AND SNATCH BLOCKS AS 2089 - 1977

TABLE A2

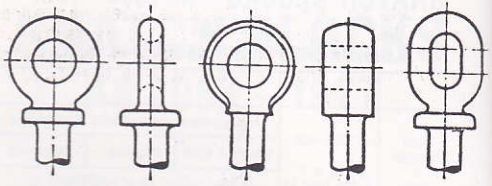
LOAD RATING PER SINGLE PART OF ROPE

1	2	3	4	5
Rope diameter d mm	Wire rope kg or t (see Note 1)	Natural fibre and synthetic filament rope		
		Manila & sisal	Polyester	Polyamide
		Load rating, kg or t (see Note 1)		
3			21	23
3½	115			
4	155	23	34	34
5	225	29	48	49
6	320	44	68	70
7	440	57 (See Note 2)	90	95
8	575	80 (See Note 2)	120	125
9	725	90 (See Note 2)	145	160
10	900	105 (See Note 2)	180	195
11	1.1			
12	1.3	160 (See Note 2)	255	280
13	1.5			
14	1.7	215	350	395
16	2.3	300	455	505
18	2.9	360	570	635
20	3.6	480	695	795
22	4.3	565	850	950
24	5.1	675 (See Note 3)	1.0	1.1
26	6.0			
28	7.0	900 (See Note 3)	1.3	1.5
32	9.2	1.1 (See Note 3)	1.7	1.9
36	12.2	1.4 (See Note 3)	2.1	2.4
40	15.1	1.7 (See Note 3)	2.6	3.0

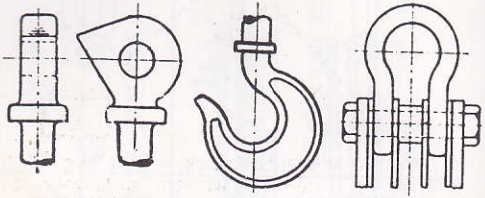
NOTES:

1. In this table the load ratings per single part of rope are listed in kilograms where less than 1 t, and in tonnes, where 1 t or greater.
2. Natural fibre ropes of 12 mm diameter or less should not be used for load-carrying purposes unless otherwise approved by the Statutory Authority.
3. Natural fibre ropes, where held by hand under load, should be 16 mm or more.

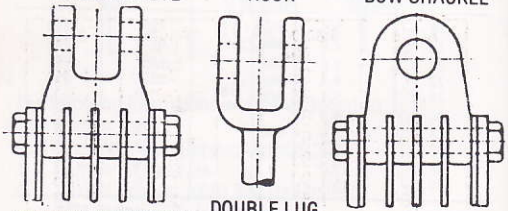
BLOCKS TYPICAL HEAD FITTINGS



ROUND EYE STUD EYE ELONGATED



DUCK BILL EYE HOOK BOW SHACKLE



FORKED CROSSHEAD DOUBLE LUG PLATE CROSSHEAD

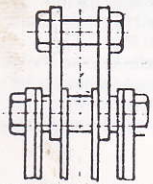


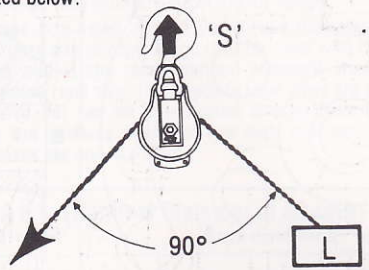
PLATE LINK

When ordering sheave blocks specify outside diameter of sheave whether block is fixed or moving and number of sheaves.

A. NOBLE & SON LTD.

LOADS ON SNATCH BLOCKS

The stress on a snatch block varies with the degree of angle between the lead and load lines. When the two lines are parallel, 1000 pounds on the lead line results in a load of 2000 pounds on the hook. As the angle between the lines increases, the stress on the hook is reduced as illustrated below.



To determine the stress on a hook, multiply the pull on the lead line by a suitable factor from the following table adding 10% for friction.

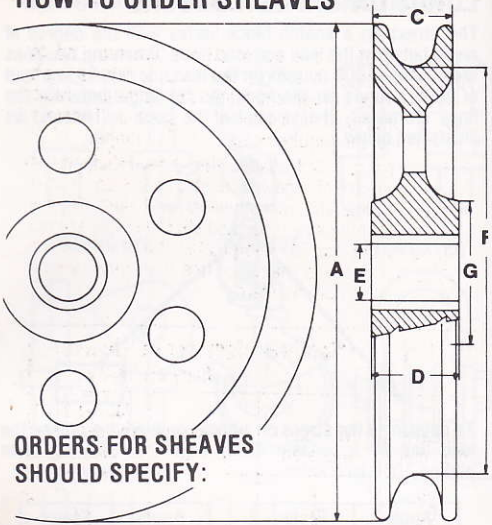
Angle	Factor
5°	1.998
10°	1.99
15°	1.98
20°	1.97
25°	1.95
30°	1.93
35°	1.90
40°	1.87
45°	1.84
50°	1.81
55°	1.77
60°	1.73

Angle	Factor
65°	1.69
70°	1.64
75°	1.58
80°	1.53
85°	1.47
90°	1.41
95°	1.35
100°	1.29
105°	1.22
110°	1.15
115°	1.07
120°	1.00

(E.g.) 'S' when L = 1.6 t at 60°
= 1.6 t x 1.73 + 10% friction.
'S' = 3.04 t (i.e. stress on hook)

A. NOBLE & SON LTD.

HOW TO ORDER SHEAVES



ORDERS FOR SHEAVES SHOULD SPECIFY:

DIMENSIONS:
A — Outside Diameter
F — Tread Diameter
C — Rim Width
E — Bore for Centre Pin
D — Hub Width
G — Hub Diameter

Diameter and Type of Rope
Manila or Wire

Type of Bushing: Plain. Roller Bearing. Bronze. Self-Lubricating, Ball or Roller Bearing.

Sheaves should be grooved to the nominal rope diameter plus an allowance of 7% to allow for rope manufacturing tolerances and should be re-machined when worn to nominal diameter plus 3%. Sheaves must also be free from score marks, run freely and be true.

SHEAVE SIZES AS 2089 - 1977

NOTES:

1. A total of 29 diameters of sheave are required to provide a sheave of the diameter appropriate for each size and type of rope and method of operation. Table A1 is condensed to a total of 12 sheave diameters which meet the requirements of the full range.
2. The rope size listed against the sheave diameter is the largest size of rope which is to be used with that sheave and is the recommended standard sheave and related rope size. Intermediate rope sizes are not tabulated but can be interpolated directly from the table, but sheaves made for use with intermediate rope sizes are non-standard.

TABLE A1 (Nominal Diameter of Sheave)

	Rope diameter d		
Sheave diameter	Wire-hand operated	Wire-power operated	Natural fibre and synthetic filament
50	4		8
63	5	3.5	10
80	6	4	12
100	8	6	16
125	10	7	20
160	12	9	24
200	16	12	32
250	20	14	40
315	24	18	
400	32	24	
500	40	28	
630		36	

By interpolation 7 mm rope requires a 100 mm sheave
9 mm rope requires a 125 mm sheave
11 mm rope requires a 160 mm sheave

SHEAVE & SNATCH BLOCKS

LOAD RATING. The load rating shall be the maximum mass which may be suspended from the head fitting but shall be not greater than the value determined by means of the appropriate formula.

LOAD RATING

Type of sheave block	Load rating of sheave block
With becket	$\frac{(2N + 1) P_R}{K_S}$
Without becket	$\frac{2 N P_R}{K_S}$

where —

N = number of sheaves

P_R = minimum breaking load of rope in kilonewtons

K_S = safety factor of rope

Type of rope		Rope size-range diameter mm	Safety factor K_S
Natural-fibre rope		N/A	6
Synthetic-filament rope		N/A	8
Wire rope	(6 x 19) (6 x 24) (6 x 37)	3.5 to 8 5 to 28 32 to 40	5

WIRE ROPE CLIPS

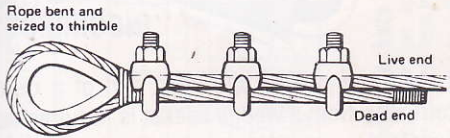
ROPE CLIPS

Clips should be spaced at a minimum of 6 rope diameters.

Diameter of Rope	No. of Clips Not Less Than
Up to and including 22 mm	3
23 mm to 32 mm	4
33 mm to 38 mm	5
39 mm to 52 mm	6
Over 52 mm	7

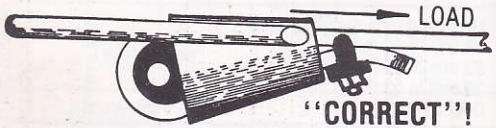
WIRE ROPE CLIPS

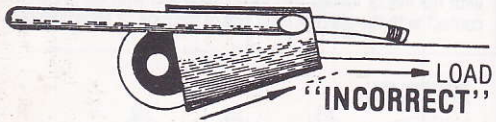
Wire rope clips should be fitted with the saddle piece in contact with the live or loaded part of the rope and with the U-bolt in contact with the short or dead end of the rope as shown below.



OPEN WEDGE SOCKETS

End fittings such as wedges, sockets and drum anchorages should be inspected for excessive wear and correct installation.





A wire rope clip on the dead end of a rope protruding from a wedge socket is required as illustrated.

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WEDGE SOCKETS DIMENSIONS

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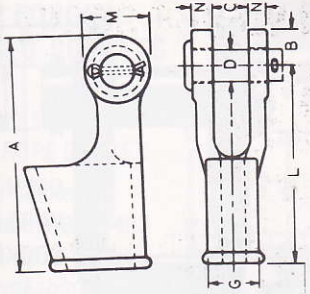
Wire Rope Diam. Inches	DIMENSIONS IN INCHES							
	A	B	C	D	G	L	M	N
3/8	5 5/8	7/8	13/16	13/16	1 1/8	4 3/4	1 9/16	7/16
1/2	6 13/16	1 1/16	1	1	1 3/8	5 3/4	1 15/16	1/2
5/8	8 5/32	1 7/32	1 1/4	1 3/16	1 3/4	6 15/16	2 1/4	9/16
3/4	9 25/32	1 13/32	1 1/2	1 3/8	2 1/16	8 3/8	2 5/8	21/32
7/8	11 5/32	1 21/32	1 3/4	1 5/8	2 5/16	9 1/2	3 1/8	3/4
1	12 3/4	2	2	2	2 9/16	10 3/4	3 3/4	7/8
1 1/8	14 3/8	2 1/4	2 1/4	2 1/4	2 15/16	12 1/8	4 1/4	1
1 1/4	16	2 1/2	2 1/2	2 1/2	3 3/16	13 1/2	4 3/4	1 1/8



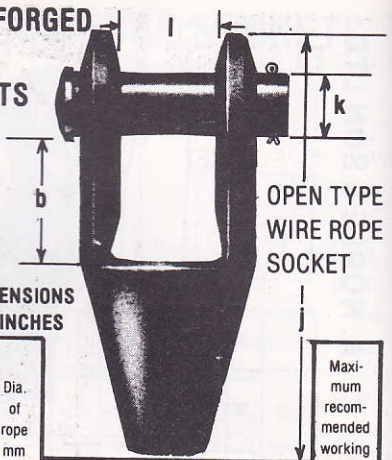
Open Wedge Sockets
Pin diameter and jaw opening designed to open socket standards. Cast steel with Manganese content, heat treated to resist abrasion.

In applying a wedge socket, the live rope should lead out of the socket in a straight line. The dead end of the rope should be secured in the offset side of the wedge.

CAST STEEL

For intermediate wire rope sizes use next larger size socket.

DROP FORGED OPEN SOCKETS



B.S.S. 463, 1958

OPEN TYPE WIRE ROPE SOCKET

DIMENSIONS IN INCHES

Nominal size (Dia. of rope) inches	Dia. of rope mm	b	j	k	l	Maximum recommended working load
				dia.		tons
$\frac{5}{16}$	8	$1\frac{1}{4}$	$3\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
$\frac{3}{8}$	9	$1\frac{11}{16}$	$4\frac{7}{16}$	$\frac{5}{8}$	$\frac{7}{8}$	1
$\frac{7}{16}$	11	$1\frac{11}{16}$	$4\frac{7}{16}$	$\frac{5}{8}$	$\frac{7}{8}$	$1\frac{1}{4}$
$\frac{1}{2}$	12	$2\frac{1}{16}$	$5\frac{5}{16}$	$\frac{13}{16}$	$1\frac{1}{8}$	2
$\frac{9}{16}$	14	$2\frac{1}{16}$	$5\frac{5}{16}$	$\frac{13}{16}$	$1\frac{1}{8}$	$2\frac{1}{4}$
$\frac{5}{8}$	16	$2\frac{1}{2}$	$6\frac{1}{4}$	$\frac{15}{16}$	$1\frac{1}{4}$	3
$\frac{3}{4}$	18	$2\frac{5}{8}$	$6\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{2}$	$4\frac{1}{4}$
$\frac{7}{8}$	22	3	$7\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{11}{16}$	$5\frac{1}{2}$
1	26	$3\frac{1}{2}$	$9\frac{5}{16}$	$1\frac{1}{2}$	$1\frac{7}{8}$	$7\frac{1}{2}$
$1\frac{1}{8}$	28	4	$10\frac{5}{16}$	$1\frac{5}{8}$	2	$9\frac{1}{2}$
$1\frac{1}{4}$	32	$4\frac{3}{8}$	$11\frac{11}{16}$	$1\frac{7}{8}$	$2\frac{1}{8}$	$11\frac{1}{2}$
$1\frac{3}{8}$	36	$4\frac{1}{2}$	13	$2\frac{1}{4}$	$2\frac{9}{16}$	14
$1\frac{1}{2}$	36	$4\frac{1}{2}$	13	$2\frac{1}{4}$	$2\frac{9}{16}$	$16\frac{1}{2}$
$1\frac{5}{8}$	40	$4\frac{1}{2}$	13	$2\frac{1}{4}$	$2\frac{9}{16}$	19

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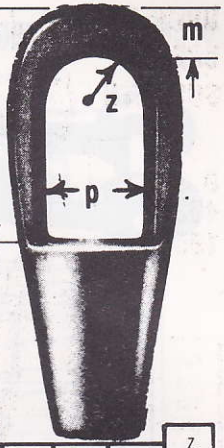
DROP FORGED CLOSED SOCKETS



CLOSED TYPE WIRE ROPE SOCKET

Larger sockets outside the B.S. 463 range, up to 4" diam. also available.

Nominal size (dia. of rope) inches	Dia. of rope mm	Maximum recommended working load	a	b	m	p	Z rad.
		tons					
$\frac{5}{16}$	8	$\frac{3}{4}$	$1\frac{11}{16}$	2	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{8}$
$\frac{3}{8}$	9	1	2	$2\frac{1}{2}$	$1\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{32}$
$\frac{7}{16}$	11	$1\frac{1}{4}$	2	$2\frac{1}{2}$	$1\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{32}$
$\frac{1}{2}$	12	2	$2\frac{3}{8}$	3	$2\frac{1}{8}$	$\frac{15}{16}$	$\frac{15}{32}$
$\frac{9}{16}$	14	$2\frac{1}{4}$	$2\frac{3}{8}$	3	$2\frac{1}{8}$	$\frac{15}{16}$	$\frac{15}{32}$
$\frac{5}{8}$	16	3	$2\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{4}$	$\frac{5}{8}$
$\frac{3}{4}$	18	$4\frac{1}{4}$	3	4	$2\frac{15}{16}$	$1\frac{1}{2}$	$\frac{3}{4}$
$\frac{7}{8}$	22	$5\frac{1}{2}$	$3\frac{3}{8}$	$4\frac{1}{2}$	$3\frac{5}{16}$	$1\frac{3}{4}$	$\frac{7}{8}$
1	26	$7\frac{1}{2}$	$4\frac{1}{8}$	$5\frac{1}{8}$	$3\frac{15}{16}$	2	1
$1\frac{1}{8}$	28	$9\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{5}{8}$	$4\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{8}$
$1\frac{1}{4}$	32	$11\frac{1}{2}$	$5\frac{1}{4}$	6	$4\frac{7}{8}$	$2\frac{1}{2}$	$1\frac{1}{4}$
$1\frac{3}{8}$	36	14	6	$7\frac{1}{4}$	$5\frac{3}{4}$	3	$1\frac{1}{2}$
$1\frac{1}{2}$	36	$16\frac{1}{2}$	6	$7\frac{1}{4}$	$5\frac{3}{4}$	3	$1\frac{1}{2}$
$1\frac{5}{8}$	40	19	6	$7\frac{1}{4}$	$5\frac{3}{4}$	3	$1\frac{1}{2}$

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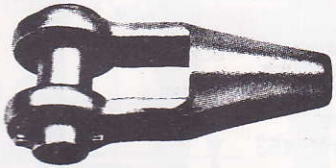
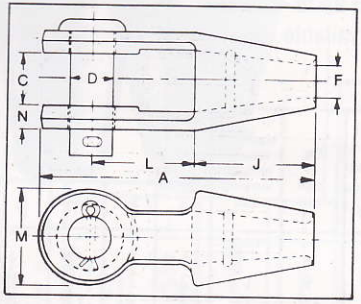
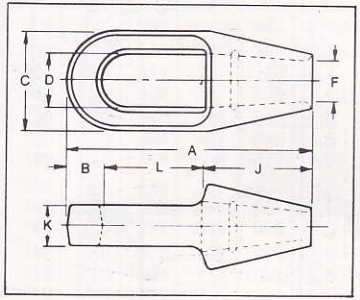
OPEN SPELTER SOCKETS
Forged Steel





Wire Rope Diam. Inches	DIMENSIONS IN INCHES								Weight Pounds Each
	A	C	D	F	J	L	M	N	
1⅝	16¼	3	3	1¾	6½	6½	5¾	1 5/16	55.
1¾-1⅞	18¼	3½	3½	2	7½	7	6½	1 9/16	85.
2-2⅛	21½	4	3¾	2¼	8½	9	7	1 13/16	125.
2¼-2⅜	23½	4½	4¼	2 5/16	9	10	7¾	2⅛	165.
2½-2⅝	25½	5	4¾	2⅞	9¾	10¾	8½	2⅜	252.
2¾-2⅞	27¼	5¼	5	3⅛	11	11	9	2⅞	315.
3-3⅛	29	5¾	5¼	3⅜	12	11¼	9½	3	380.
3¼-3⅜	30⅞	6¼	5½	3⅝	13	11¾	10	3⅛	434.
3½-3⅝	33¼	6¾	6	3⅞	14	12½	10¾	3¼	563.
3¾-4	36¼	7½	7	4¼	15	13½	12½	3½	783.

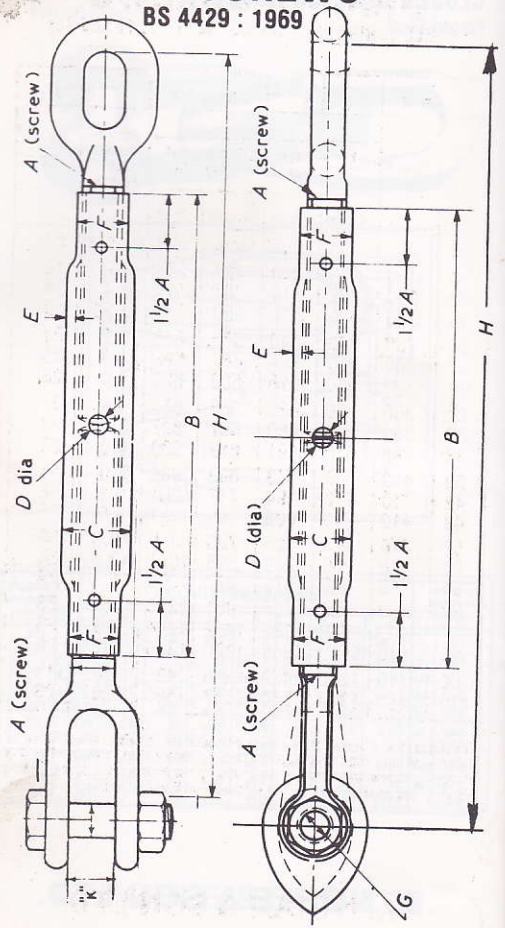
CLOSED SPELTER SOCKETS
Forged Steel



Wire Rope Diam. Inches	DIMENSIONS IN INCHES								Weight Pounds Each
	A	B	C	D	F	J	K	L	
1⅝	15⅜	2⅛	5¾	3¼	1¾	6½	2¾	6¾	36.
1¾-1⅞	17½	2 3/16	6¾	3 17/32	2	7½	3	7 13/16	58.
2-2⅛	19¾	2 7/16	7⅝	3 25/32	2¼	8½	3¼	8 13/16	80.
2¼-2⅜	21⅝	2⅞	8½	4 9/32	2½	9	3⅝	9¾	105.
2½-2⅝	23½	3⅛	9½	5½	2⅞	9¾	4	10⅝	140.
2¾-2⅞	25⅞	3⅜	10¾	6¼	3⅛	11	4⅞	11¼	220.
3-3⅛	27	3¼	11½	6¾	3⅜	12	5¼	11¾	276.
3¼-3⅜	29¼	4	12¼	7¼	3⅝	13	5¾	12¼	313.
3½-3⅝	31	4	13	7¾	3⅞	14	6¼	13	400.
3¾-4	33¼	4¼	14¼	8½	4¼	15	7	14	540.

RIGGING SCREWS

BS 4429 : 1969



RIGGING SCREWS

TABLE 1, RIGGING SCREWS (see Figs. 1a and 1b)

1	2	3	4	5	6	7	8
Size of screw A	B	H				Recommended safe working load	K
		Eye and eye (Fig. 1a)		Eye and fork (Fig. 1b)			
		Closed	Open	Closed	Open		
mm	mm	mm	mm	mm	mm	tonnes	mm
10	150	220	340	224	344	0.25	12
12	230	320	514	321	515	0.4	14
16	230	350	532	352	534	0.63	19
20	230	370	540	375	545	1.0	23
22	300	460	694	462	696	1.6	25
24	360	530	818	536	824	2.0	28
27	360	550	829	556	835	2.5	31
30	380	590	880	597	887	3.15	34
33	380	610	891	619	900	4.0	38
39	410	680	973	692	985	5.0	45
42	410	710	994	717	1001	6.3	48
48	410	740	1006	755	1021	8.0	55
52	410	770	1024	786	1040	10.0	60
56	410	800	1042	815	1057	12.5	64
64	410	860	1078	877	1095	16	74
72	460	960	1204	981	1225	20	83
76	460	990	1222	1012	1244	25	88
85	510	1110	1365	1130	1385	32	98
100	510	1210	1420	1215	1425	40	115
110	560	1330	1560	1357	1587	50	126

The required size of wire rope will depend upon the tensile grade of its wires; its construction; and the appropriate factor of safety. The corresponding size of rigging screw will normally be a rigging screw having a specified safe working load equal to the required safe working load of the rope.

A. NOBLE & SON LTD.

TURNBUCKLES

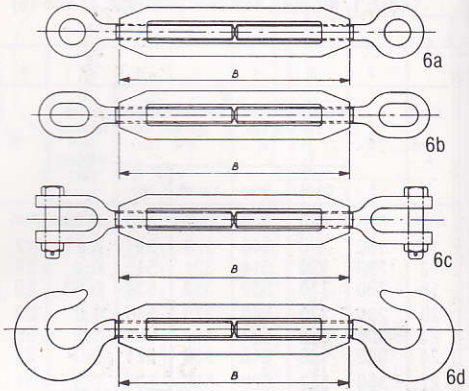
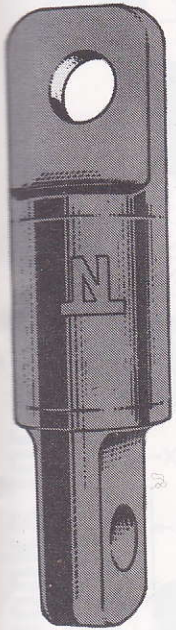


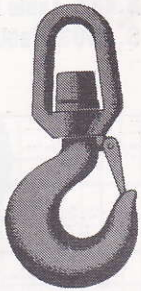
TABLE 6. TURNBUCKLES (see Figs. 6*a* to 6*d*)

1	2	3	4	5	6
Size of screw *A*	*B*		Recommended safe working load	Proof load	
	Series 1	Series 2		Mass	Force *FL*
mm	mm	mm	tonnes	tonnes	kN
10	150	182	0·25	0·5	4·90
12	230	190	0·4	0·8	7·85
16	230	202	0·63	1·25	12·3
20	230	214	1·0	2·0	19·6
22	300	222	1·6	3·2	31·4
24	360	228	2·0	4·0	39·2
30	380	246	3·15	6·3	61·8
39	410	276	5·0	10·0	98·1
42	410	286	6·3	12·5	123
48	410	304	8·0	16	157
52	410	318	10·0	20	196
56	410	330	12·5	25	245

SERIES 2 PREFERRED SIZE

BALL BEARING SWIVEL
(alloy hooks)
TSF SERIES
SWL
1 - 100 TONNES



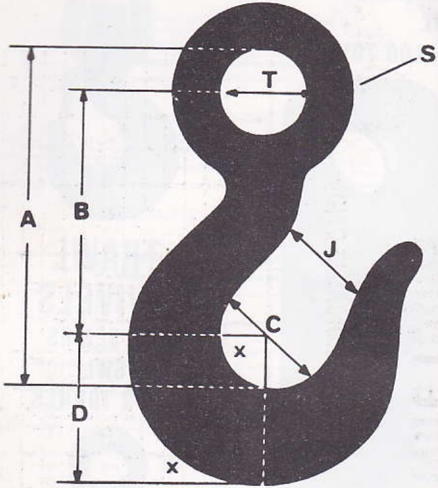


TRAWL SWIVELS
TST SERIES
SWL
1 & 3 TONNES

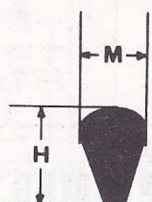
SEALED BEARING SWIVELS
SBS SERIES SWL 3 — 55 TONNES

eye hooks for wire ropes

B.S.S.482, Table 6
B.S.S. 2903, Table 6



SECTION X–X



A. NOBLE & SON LTD.

eye hooks for wire ropes

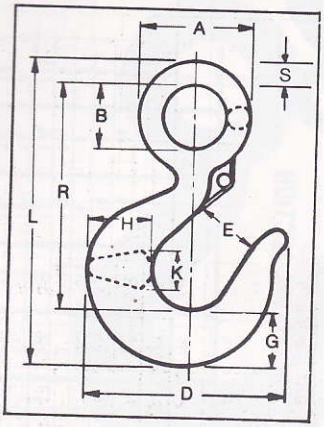
B.S.S.482, Table 6
B.S.S. 2903, Table 6

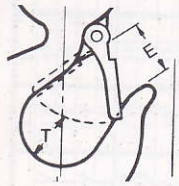
TRAPEZOIDAL SECTION

BSS 482 Table 6	BSS 2903 Table 6											
S.W.L. Tons	S.W.L. tons/cwts		A	B	C	D	H	J	M	S	T
1/4		6	2 11/16	1 7/8	15/16	1 3/16	11/16	11/16	1/2	3/8	5/8
1/2		13	3 11/16	2 5/8	1 5/16	1 11/16	1	1	11/16	9/16	13/16
3/4	1	0	4 3/16	3 1/4	1 5/8	2 1/16	1 1/4	1 1/4	13/16	11/16	1
1	1	6	5 1/8	3 5/8	1 13/16	2 3/8	1 7/16	1 3/8	15/16	3/4	1 1/8
1 1/2	2	0	6 1/4	4 7/16	2 1/4	2 7/8	1 3/4	1 11/16	1 1/8	7/8	1 3/8
2	2	13	7 5/16	5 3/16	2 5/8	3 3/8	2	1 15/16	1 5/16	1 1/16	1 5/8
2 1/2	3	6	8 3/16	5 13/16	2 15/16	3 13/16	2 5/16	2 1/4	1 1/2	1 3/16	1 13/16
3	4	0	8 7/8	6 5/16	3 13/16	4 1/8	2 1/2	2 3/8	1 5/8	1 1/4	2
4	5	6	10 5/16	7 5/16	3 11/16	4 3/4	2 7/8	2 3/4	1 7/8	1 1/2	2 1/4
5	6	13	11 1/2	8 3/16	4 1/8	5 5/16	3 1/4	3 1/8	2 1/8	1 5/8	2 1/2
6	8	0	12 9/16	8 15/16	4 1/2	5 3/4	3 1/2	3 3/8	2 5/16	1 13/16	2 3/4
7 1/2	10	10	14	9 15/16	5	6 1/2	3 15/16	3 3/4	2 9/16	2	3

EYE HOOKS

ALLOY STEEL





Eye Hook Dimensions with Latch Assembled.

Quenched and tempered.

Proper design, careful forging and precision controlled quench and tempering gives maximum strength and "fatigue resistance" without excessive weight and bulk.

Rated capacity is permanently shown on each hook.

A. NOBLE & SON LTD.

EYE HOOKS

Alloy steel.

A. NOBLE & SON LTD.

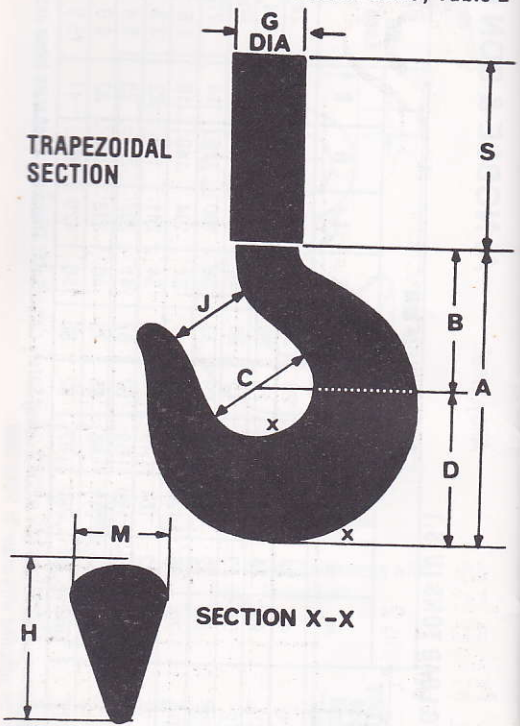
SAFE WORKING LOAD TONS (U.S.)

Working Load Limit Tons**	Dimensions In MM											KG Each
	A	B	D	F	G	H	K	L	R	S		
1	43	24	76	25	20	23	14	115	86	9		.24
1½	46	24	81	27	21	25	16	125	91	11		.34
2	54	29	90	29	25	28	17	141	103	13		.50
3	60	32	102	32	29	33	21	160	116	14		.77
4½	70	36	125	39	36	41	27	194	140	18		1.6
7	86	42	164	49	46	54	34	241	173	22		3.3
11	108	52	196	59	57	67	41	297	211	29		5.4
15	124	61	217	65	65	75	46	333	236	32		8.0
22	162	80	290	87	82	96	56	429	306	41		15.9

Hooks can be converted to SAFETY HOOKS using Safety Latch Sets. These are a separate loose assembly which can be supplied with order or fitted later.

shank hooks

B.S.S.482, Table 2 **B.S.S. 2903, Table 2**



Other sizes (or with longer shanks, larger G dimension Hand Forged)

A. NOBLE & SON LTD.

A. NOBLE & SON LTD.

shank hooks

B.S.S.482, Table 2
B.S.S. 2903, Table 2

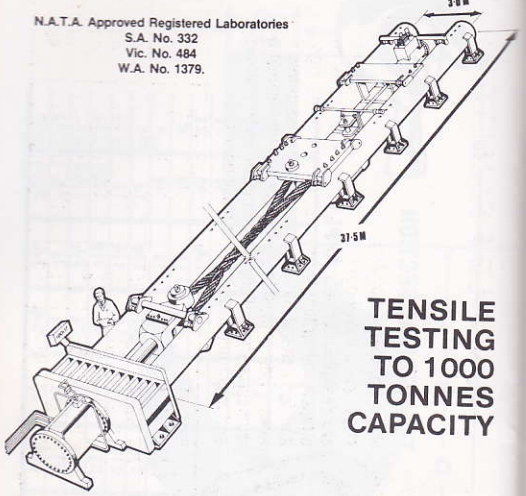
TRAPEZOIDAL SECTION

IMPERIAL SIZES APPLY

BSS 482 Table 2	BSS 2903 Table 2											
S.W.L. Tons	S.W.L. tons/cwts	A	B	C	D	G	H	J	M	S
¼		6	2 1/4	1 1/16	1/8	1 3/16	3/8	1/2	1/2	1/4	2 1/4
½		13	3 7/16	1 1/2	1 7/16	1 11/16	1/2	1	1	1/2	2 1/8
½		13	3 3/8	1 1/2	1 7/16	1 11/16	1/2	1	1	1/2	2 3/4
¾	1	0	3 1/8	1 1/2	1 7/16	2 1/16	1	1 1/2	1 7/16	1/2	2 7/8
1	1	6	4 1/2	2 1/8	1 13/16	2 3/8	1	1 7/16	1 3/8	1/2	4
1	1	6	4 1/2	2 1/8	1 13/16	2 3/8	1 1/2	1 7/16	1 3/8	1/2	4
1½	2	0	5 7/16	2 1/8	2 1/4	2 1/16	1 1/2	1 7/16	1 3/8	1/2	5
1½	2	0	5 3/16	2 1/8	2 1/4	2 1/16	1 1/2	1 7/16	1 3/8	1/2	3 1/2
2	2	13	6 1/8	3	2 1/8	3 1/8	1 7/16	2	1 7/16	1 7/16	3 1/2
—	3	0	6 1/8	3 1/4	2 1/8	3 1/16	1 7/16	2 1/16	2 7/16	1 7/16	5
3	4	0	7 1/8	3 11/16	3 7/16	4 1/16	1 1/2	2 1/16	2 3/8	1 1/16	4 1/2
5	6	13	10 1/8	4 13/16	4 1/16	5 5/16	2 1/16	3 1/16	3 7/16	2 1/16	5 1/2

TESTING

N.A.T.A. Approved Registered Laboratories
S.A. No. 332
Vic. No. 484
W.A. No. 1379.



TENSILE TESTING TO 1000 TONNES CAPACITY

PROOF LOADING OF LIFTING GEAR
- Wire Rope Slings
- Pulley Blocks
- Hooks • Shackles
- Chain
- Mooring and Towing Equipment

DESTRUCTION TESTING
- Winding Ropes
- Lifting Gear
- Engineering Components
- Welded Steel Assemblies
- Anchor Chain Samples.

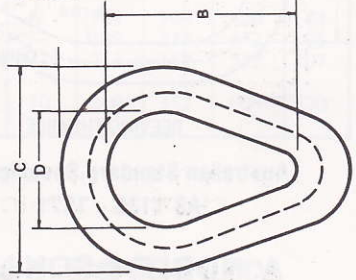
CONTACT US FOR DETAILS OF TESTING SERVICES

A. NOBLE & SON LTD.

A. NOBLE & SON LTD.

Hawser thimbles

Generous inside dimensions allow thimbles to fit the largest shackles and crane hooks. Please note the chart below.

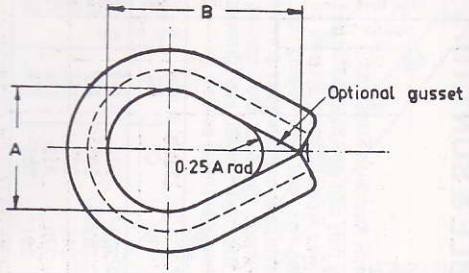


Rope Size	Part Number	A	B	Dimen. in mm. C	D	E	F
36-40	441576	308	203	222	127	56	43
44	441584	324	203	235	127	62	48
48-52	441592	375	241	273	152	68	54
56	441600	435	279	318	178	79	60
60	441618	610	381	381	254	95	73

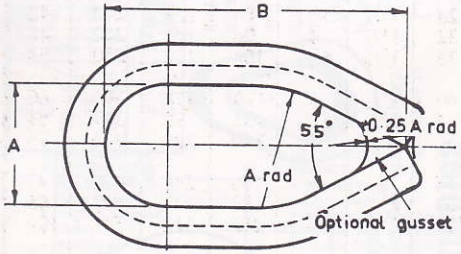
N.B.: Not covered by Australian Standards.
These extra heavy duty cast steel hawser thimbles are designed for wire rope anchoring systems on offshore oil drilling rigs, salt water towing rigs, and for general industrial use. Thimbles prevent eyes from mashing together and causing excessive wear. They have smooth, even grooves and maximum strength at critical points.

THIMBLES

TABLE 2
ORDINARY AND REEVING THIMBLES



ORDINARY THIMBLE



REEVING THIMBLE

Australian Standard Specification
AS 1138 - 1971

A. NOBLE & SON LTD.

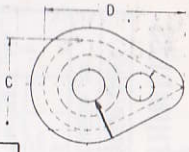
TABLE 2 SIZES
ORDINARY AND REEVING THIMBLES

1	2	3	4	5	6	7
Wire Rope Size			Dimensions of Thimble, mm			
Nominal Size			A	B approx.		F max.
Dia. mm	Dia. in	Circ. in		Ordinary thimble	Reeving thimble	
8	5/16	1	24	35	60	12
10	3/8	1 1/4	30	44	75	15
12	1/2	1 1/2	36	53	90	18
14	9/16	1 3/4	42	62	105	21
16	5/8	2	48	70	120	24
18	11/16	2 1/4	54	79	135	27
20	13/16	2 1/2	60	88	150	30
22	7/8	2 3/4	66	97	165	33
25	15/16	3	75	110	187	38
28	1 1/8	3 1/2	84	123	210	42
32	1 1/4	4	96	141	240	48
36	1 3/8	4 1/2	108	158	270	54
40	1 1/2	5	120	176	300	60
45	1 3/4	5 1/2	135	198	337	68
50	—	6	150	220	375	75
56	2	7	168	246	420	84
63	2 1/2	—	189	277	472	95
71	2 3/4	—	213	312	532	107
80	—	10	240	352	600	120

A. NOBLE & SON LTD.

SOLID THIMBLES

These fittings can be supplied to suit all sizes of rope. Hole will be drilled to suit pin size as specified when ordering.

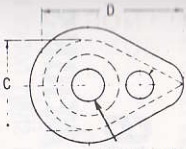


Wire Rope Size			Dimensions of Thimble, mm				
Dia. mm	Dia. in	C	D approx.	E nom.	F max.	G approx.	H
8	5/16	30	54	12	12	4	9.2
10	3/8	38	68	16	15	5	11.5
12	1/2	46	82	20	18	6	14
14	9/16	53	95	24	21	7	16
16	5/8	61	109	27	24	8	19
18	11/16	68	122	30	27	9	21
20	13/16	76	136	33	30	10	23
22	7/8	84	150	36	33	11	25
25	15/16	95	170	39	38	12	29

A. NOBLE & SON LTD.

SOLID THIMBLES

These fittings can be supplied to suit all sizes of rope. Hole will be drilled to suit pin size as specified when ordering.



Wire Rope Size			Dimensions of Thimble, mm				
Dia. mm	Dia. in	C	D approx.	E nom.	F max.	G approx.	H
28	1 1/8	106	190	45	42	14	32
32	1 1/4	122	218	52	48	16	37
36	1 3/8	137	245	60	54	18	42
40	1 1/2	152	272	64	60	20	46
45	1 3/4	171	306	72	68	22	52
50	—	190	340	80	75	25	58
56	2	213	381	90	84	28	64
63	2 1/2	240	428	100	95	31	72
71	2 3/4	270	483	115	107	35	82

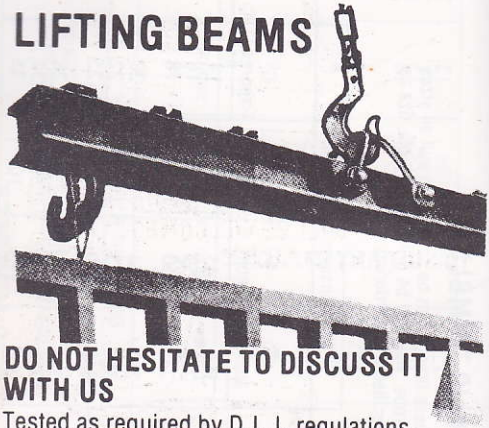
A. NOBLE & SON LTD.

NOBLES ENGINEERING

WELDED FABRICATIONS

can be designed and made at short notice to meet your particular requirements.

LIFTING BEAMS



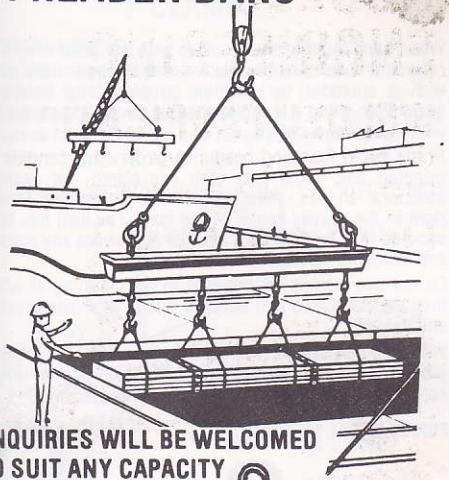
DO NOT HESITATE TO DISCUSS IT WITH US

Tested as required by D.L.I. regulations.

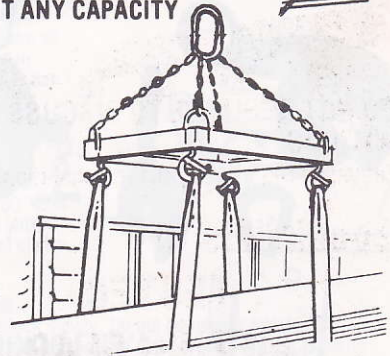
specialists in TESTED LIFTING GEAR

A. NOBLE & SON LTD.

SPREADER BARS



ENQUIRIES WILL BE WELCOMED TO SUIT ANY CAPACITY



"NOTHING IS IMPOSSIBLE"

A. NOBLE & SON LTD.

LIFTING CLAMPS

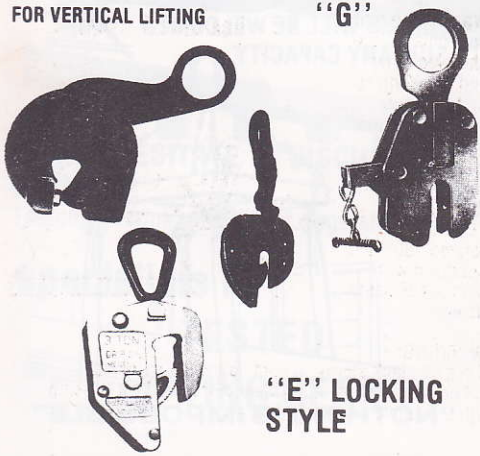
When handling thin sheet metals with low dead weight we recommend to use at least two clamps (eventually along with a spreader bar). When gripping long beams or girders for lifting it is indispensable to use a spreader bar with at least two clamps.

In the event that long beams or girders are handled for gripping and lifting only with one clamp, for example structural shapes, the clamp has to be applied to load right in the gravity center of the load. The load has to be secured by a holding cord in order to prevent any rotating and swinging movement.

Do not use clamps for material to the handling of which they are not suited and adapted due to their construction and design.

When employing several clamps in a sling attachment please give particular attention to the loss of lifting capacity which will occur under the spreader angle.

FOR VERTICAL LIFTING **"G"**



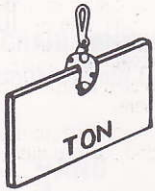
"E" LOCKING STYLE

A. NOBLE & SON LTD.

INSTRUCTIONS FOR USE OF CLAMPS

VERTICAL LIFTING

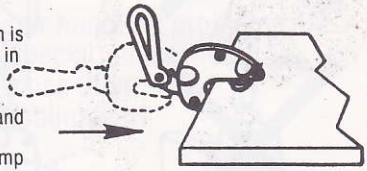
WARNING: Select proper size clamp for the job. Determine the weight of the plate to be lifted. Do not exceed WLL (working load limit) shown on clamp. Plate thickness must be within grip range shown on clamp.



WARNING: Inspect clamp. If cam or pad teeth are worn, or if clamp if damaged, do not use.

When lifting from horizontal, place short leg down and lift clamp so that pad is in contact with the underside of plate, and cam is holding clamp in that position. Plate may be rotated 180° and set down with long leg of clamp down.

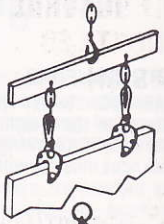
HORIZONTAL START



WARNING:
Take up slack slowly. Do not bounce or jerk load.
All personnel must stand clear of load while it is being lifted or moved.

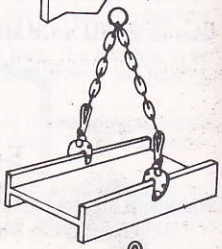
A. NOBLE & SON LTD.

Use of a spreader bar is the preferred method when two or more clamps are used together.



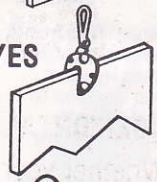
VERTICAL LIFTING

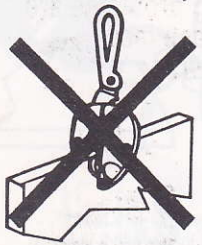
Double chain slings may be used when grabbing opposite flanges.

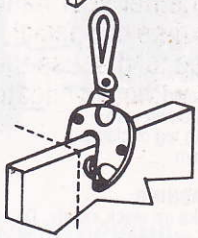


NO

YES







WARNING: Attach clamp so that it is square with plate, and so that plate is inserted to full depth of opening.

A. NOBLE & SON LTD.

STRUCTURAL SHORT LEG DESIGN

CLAMPS WITH CHAIN CONNECTOR
Ready for Assembly to Your Chain

HAND GRIP

For manual or conveyor use.

HORIZONTAL LIFTING

Whether your handling problems are routine or special, please feel free to discuss them with us without obligation.

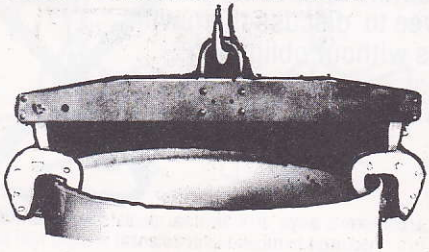
A. NOBLE & SON LTD.

SINGLE DRUM LIFTER

Designed to accommodate a great variety of drums with or without heads removed.

Drums can be lifted from horizontal or vertical position and reversed. Not suitable for lifting plates or sheets.

TWIN DRUM LIFTER



FORK TRUCK DRUM LIFTER

Transforms any fork lift truck into a safe, efficient mobile overhead lifting unit. Simply slip onto the forks. Two knife edged levers grip the forks tightly. When load is removed – just lift off.

The drop forged Drum Lifting Clamps will accommodate a great variety of drums with or without heads removed. With shackle in position shown, the unit can be used on any crane to lift, load or transport drums – in same manner as with the Twin Model No. 252. Placing shackle in reverse position permits slinging of other objects.

AUTOMATIC FORK LIFT ATTACHMENT

Transforms any fork lift into a safe, efficient mobile overhead lifting unit. No adjustments.

WEIGHTS OF MATERIALS - APPROXIMATE METRIC DENSITIES

Material	By unit	t/m^3
Aluminium	—	2.7
Asbestos cement	1.8 kg/m^2/mm thick	1.8
Ballast, blue metal	—	1.9
Blocks, hollow concrete 100 mm	1.6 kg/m^2/mm thick	1.6
Blocks, hollow concrete 200 mm	1.2 kg/m^2/mm thick	1.2
Blocks, terra cotta 100 mm	1.0 kg/m^2/mm thick	1.0
Bricks, clay, common	2.5 t/1 000	1.6
Caneite	0.4 kg/m^2/mm thick	0.4
Cast Iron	—	7.2
Cement	20 bags/t	1.5
Concrete, wet or set	—	2.4
Distillate	0.8 kg/l	0.8
Drum, 200 l empty	40 kg	—
Drum, 200 l of petrol	180 kg	—
Earth, loose	—	1.8
Fibrous plaster	1.0 kg/m^2/mm thick	1.0
Glass	2.6 kg/m^2/mm thick	2.6
Gypsum plaster sheet	1.8 kg/m^2/mm thick	1.8
Hardboard	1.0 kg/m^2/mm thick	1.0
Hardwood, average	—	1.0
Lead	—	11.3
Limestone, broken	—	2.1
Paint, average	2.1 kg/l	2.1
Paint, red or white lead	3.1 kg/l	3.1
Pallet, hardwood	40 kg	—
Petrol	0.7 kg/l	0.7
Road, metal or aggregate	—	1.9
Sand, dry	—	1.7
Sand, wet	—	1.9
Scaffold tubes, 4.9 mm thick	*5 kg/m	—
Softwood, average	—	0.6
Steel bar, diameter d mm	*d^2/160 kg/m	7.8
Steel rails - as marked	*10 lb./yd. = 5 kg/m	7.8
Steel sections - as marked	*10 lb./ft. = 15 kg/m	7.8
Tiles, cement	380 kg/100	—
Tiles, terra cotta	350 kg/100	—
Timber - see Hardwood, Softwood	—	—
Water, fresh	1.0 kg/l	1.0

*indicates approximation, within 3 per cent.

Examples:

Heap of softwood about 3 m long x 1 m wide x 2/3 m high:
3 x 1 x 2/3 = 2 m^3; 2 x 0.6 = 1.2 t.

Five 12 m lengths of 94 lb. steel railway rail:
5 x 12 x 94 x 5/10 = 2 820 kg = 2.8 t.

Forty 9 m lengths of 20 mm steel rods:

$$40 \times 9 \times \frac{20 \times 20}{160} = 900 \text{ kg} = 0.9 \text{ t.}$$

RULE OF THUMB CALCULATIONS

Only to be used when safe working charts are not readily available; - will give the operator a reasonable guide for safety.

1. **SISAL/MANILLA ROPE**
   Square the rope diameter (mm)
   = S.W.L. (kg)
   e.g. 10 mm diameter sisal
   = 10 x 10
   S.W.L. = 100 kg

2. **WIRE ROPE**
   Square the rope diameter (mm) x 8
   = S.W.L. (kg)
   e.g. 20 mm wire = 20 x 20 x 8
   = 3200 kg
   S.W.L. = 3.2 tonne

3. **CHAIN**
   •3d^2 x grade = S.W.L. (kg)
   e.g. S.W.L. of 13 mm grade 30,
   •3 x 13 x 13 x 30 = 1520 kg
   S.W.L. = 1.52 tonne

METRIC CONVERSION TABLES

LENGTH

Inches	X	25.4	= Millimetres
Feet	X	.3048	= Metres
Yards	X	.9144	= Metres
Miles	X	1.6093	= Kilometres
Millimetres	X	.03937	= Inches
Metres	X	3.281	= Feet
Metres	X	1.0936	= Yards
Kilometres	X	.6214	= Miles

WEIGHT

Grains	X	.0648	= Grams
Ounces	X	28.35	= Grams
Pounds	X	.4536	= Kilograms
Tons	X	1016.05	= Kilograms
Grams	X	15.432	= Grains
Grams	X	.0353	= Ounces (Avoir.)
Kilograms	X	2.2046	= Pounds
Kilograms	X	.00098	= Tons

1 Tonne (Metric = 1,000 K.gm. = 2,205 lbs.
= .9842 British tons.

AREA

Sq. Inches	X	6.4516	= Sq. Centimetres
Sq. Feet	X	.0929	= Sq. Metres
Sq. Yards	X	.8361	= Sq. Metres

VOLUME

Cub. inches	X	16.39	= Cub. centimetres
Cub. feet	X	.02832	= Cub. metres
Cub. Yards	X	.7646	= Cub. metres
Cub. inches	X	.01639	= Litres
Cub. feet	X	6.229	= Gallons
Gallons	X	4.5461	= Litres
Cub. centimetres	X	.061	= Cub. inches
Cub. metres	X	35.315	= Cub. feet
Cub. metres	X	1.308	= Cub. yards
Litres	X	61.024	= Cub. inches
Gallons	X	.1605	= Cub. feet
Litres	X	.22	= Gallons

1 gallon = 8 pints = 277.42 cub. ins. = 10 lbs.
1 cub. ft. of Water = 62.3 lbs. = 28.317 litres
= 6 1/4 gallons (approx.)

PRESSURE

Lbs. per sq. in.	X	.07031	= K.gms. per sq. cm.
Lbs. per sq. ft.	X	4.882	= K.gms. per sq. m.
Lbs. per sq. in	X	.068	= Atmospheres
Lbs. per sq. in.	X	2.312	= Ft. of Water
K.gms. per sq. cm.	X	14.223	= Lbs. per sq. in.
K.gms. per sq. m.	X	.2048	= Lbs. per sq. ft.
Atmospheres	X	14.71	= Lbs. per sq. in.
Ft. of Water	X	.4326	= Lbs. per sq. in.

1 Atmosphere = 34 ft. of Water (approx.)
= 30 ins. of Mercury (approx.)

The best way to remember a phone number —
is to write it down.

NAME	AREA CODE	PHONE No.
A. NOBLE & SON LTD.		
ADELAIDE	08	260 6688
MELBOURNE	03	546 5211
PERTH	09	272 5666
WHYALLA	086	45 0624
KARRATHA	091	85 2244
SYDNEY	02	648 1166
BRISBANE	07	277 9222

A. NOBLE & SON LTD.

NAME	AREA CODE	PHONE No.

Dudley Gay Printing

A. NOBLE & SON LTD.

HAND SIGNALS

MOTION	HAND SIGNAL	WHISTLE BELL OR BUZZER SIGNAL
Hoisting raise		2 short ●●
Luffing boom up		3 short ●●●
Slewing right		1 long, 2 short —●●
Jib-trolley out; Telescoping boom extend		1 long, 3 short —●●●
Travel and traverse		Not Applicable

A. NOBLE & SON LTD.

MOTION	HAND SIGNAL	WHISTLE BELL OR BUZZER SIGNAL
[illegible]		1 long —
[illegible]		4 short ●●●●
[illegible]		1 long 1 short —●
[illegible]		1 long 4 short —●●●●
[illegible]		1 short ●

[illegible] APPROPRIATE HAND SIGNAL FOR MOTION WITH HAND OPENING AND CLOSING

REGULATION HAND SIGNALS — WHISTLE SIGNALS FOR SURFACE CRANES & HOISTS

Nobles
Offer
Best
Lifting
Equipment
Services

A. NOBLE & SON LTD.